

NOV 12 1924

Medical Lib

Series 3, Vol. 7, No. 11

NOVEMBER, 1924

# AMERICAN JOURNAL OF OPHTHALMOLOGY

Incorporating

Established by

THE AMERICAN JOURNAL OF OPHTHALMOLOGY.....Adolph Alt 1884  
THE OPHTHALMIC RECORD.....Giles C. Savage 1891  
ANNALS OF OPHTHALMOLOGY.....James Pleasant Parker 1892  
ANALES DE OPTALMOLOGIA.....M. Uribe-Troncoso 1898  
OPHTHALMOLOGY.....Harry Vanderbilt Würdemann 1904  
OPHTHALMIC YEAR BOOK AND LITERATURE.....Edward Jackson 1904-11

## EDITORIAL STAFF

EDWARD JACKSON

Editor

M. URIBE-TRONCOSO

MEYER WIENER

CLARENCE LOEB

Associate Editor

CASEY A. WOOD

HARRY V. WÜRDEMANN

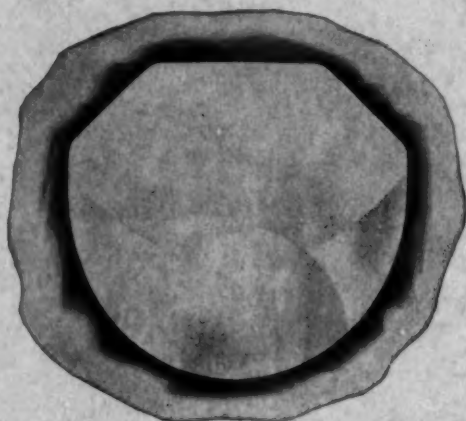
## COLLABORATORS

FRANK ALLPORT, *Chicago*; HUGO W. AUFMWASSER, *Cincinnati*; HANS BARKAN, *San Francisco*; ARTHUR J. BEDELL, *Albany*; EDMOND E. BLAAUW, *Buffalo*; MELVILLE BLACK, *Denver*; FRANK E. BRAWLEY, *Chicago*; BURTON CHANCE, *Philadelphia*; WILLIAM H. CRISP, *Denver*; EDWARD C. ELLETT, *Memphis*; MARCUS FRINGOLD, *New Orleans*; WILLIAM C. FINNOFF, *Denver*; WALTER S. FRANKLIN, *San Francisco*; M. W. FREDRICK, *San Francisco*; HAROLD GIFFORD, *Omaha*; SANFORD R. GIFFORD, *Omaha*; HARRY S. GRADLE, *Chicago*; D. F. HARRIDGE, *Phoenix, Arizona*; WILLIAM F. HARDY, *St. Louis*; EMORY HILL, *Richmond, Va.*; THOMAS B. HOLLOWAY, *Philadelphia*; JOHN A. McCaw, *Denver*; LLOYD MILLS, *Los Angeles*; WILLIAM R. MURRAY, *Minneapolis*; WALTER R. PARKER, *Detroit*; LAWRENCE T. POST, *St. Louis*; F. MAYO SCHNEIDEMAN, *Philadelphia*; THEODORE B. SCHNEIDEMAN, *Philadelphia*; GEORGE E. DE SCHWEINITZ, *Philadelphia*; THOMAS H. SHASTID, *Superior, Wis.*; CHARLES P. SMALL, *Chicago*; D. L. TILDERQUIST, *Duluth*; HENRY P. WAGENER, *Rochester, Minn.*; WILLIAM ZENTMAYER, *Philadelphia*; CHARLES ZIMMERMANN, *Milwaukee*. Foreign: RAUL ANGANARAZ, *Buenos Aires, Argentina*; SIR JAMES W. BARRETT, *Melbourne, Australia*; MARCEL DANIS, *Brussels, Belgium*; ROBERT HENRY ELLIOTT, *London, England*; JULIUS FEJÉR, *Budapest, Hungary*; F. M. FERNANDEZ, *Havana, Cuba*; J. DE J. GONZALEZ, *Leon, Mexico*; HARVEY J. HOWARD, *Peking, China*; M. LANDOLT, *Paris, France*; ARTHUR F. MCCALLAN, *Cairo, Egypt*; SPECIALE CIRINCIONE, *Rome, Italy*; FREDERICK C. TOOKER, *Montreal, Canada*; MAJOR R. E. WRIGHT, *Madras, India*.

Single number, one dollar

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY  
7 West Madison Street, Chicago, Illinois.

Entered as Second Class Matter January 1st, 1918, at the Post Office, Chicago, Ill., under the act of March 3rd, 1879.



**THE LENS WITH THREE FIELDS OF  
VISION—NEAR, FAR AND INTERMEDIATE**

***Cross Trifocal*  
LENSES**

Are easy to wear. They give the same comfort as accurately fitted single vision lenses and eliminate "breaking in" and "jump" of the image.

*Write for Booklet*

*Deliveries now at all our houses.*

**RIGGS OPTICAL COMPANY**

**DEPENDABLE RX SERVICE**

OMAHA  
DENVER  
SEATTLE  
MADISON  
SIOUX CITY  
SIOUX FALLS  
SAN FRANCISCO  
ST. PAUL, MINN.

QUINCY  
PUEBLO  
WANKATO  
HASTINGS  
IOWA CITY  
GREAT FALLS  
SALT LAKE CITY  
OGDEN

SALINA  
WICHITA  
APPLETON  
GREEN BAY  
LOS ANGELES  
OKLAHOMA CITY  
RENO, NEVADA  
FARGO

TACOMA  
LINCOLN  
PORTLAND  
POCATELLO  
CEDAR RAPIDS  
COUNCIL BLUFFS  
BOISE  
BUTTE

SPOKANE  
WATERLOO  
FORT DODGE  
KANSAS CITY  
PITTSBURG, KAN.  
SANTANA, CALIF.



O. D.

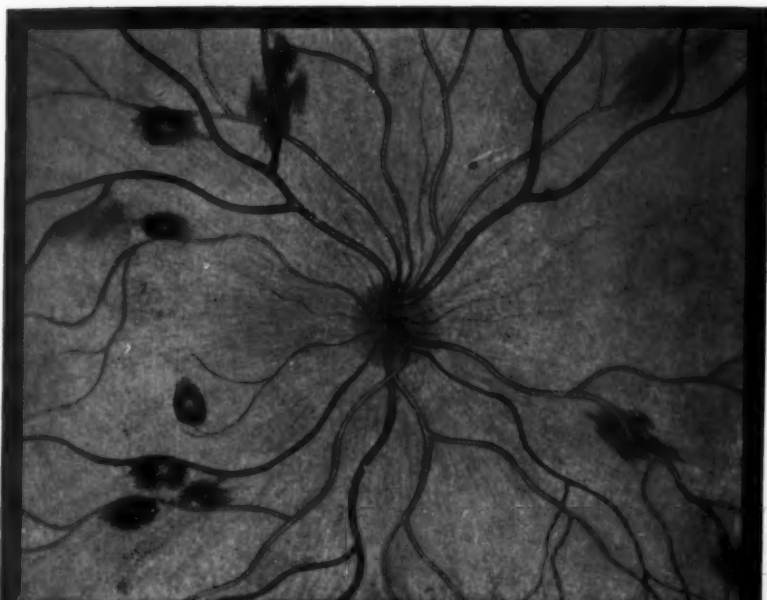


O. S.

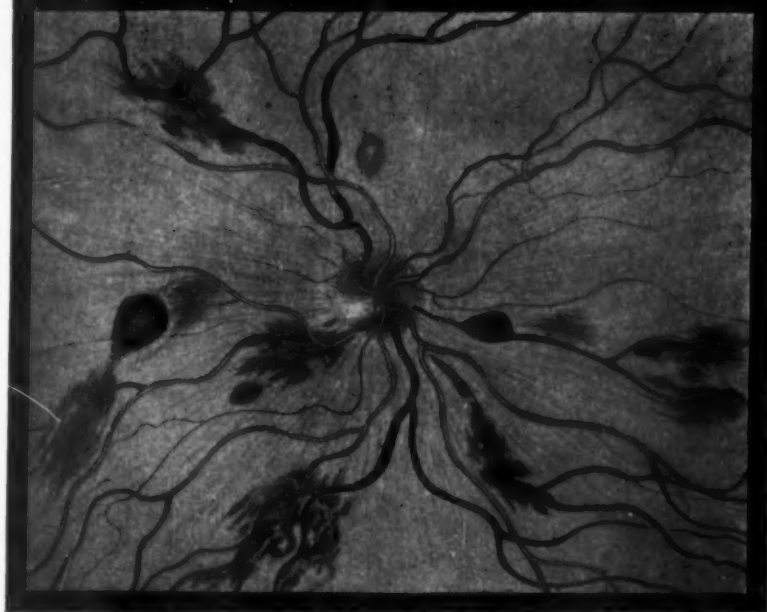


KALA AZAR ANEMIA AND RETINAL HEMORRHAGES (LING)

O. D.



O. S.



KALA AZAR ANEMIA AND RETINAL HEMORRHAGES (LING)



# AMERICAN JOURNAL OF OPHTHALMOLOGY

Vol. 7

NOVEMBER, 1924

No. 1

## OCULAR CHANGES IN KALA-AZAR IN PEKING.

W. P. LING, M.D.

PEKING, CHINA.

After a brief synopsis of the general character of this disease and the organism associated with it, the general features of 20 cases are reported in tabular form, and four cases presenting eye lesions are described in detail. The principal eye lesions are pallor of the conjunctiva, xerosis with keratomalacia, and the fundus changes of hemorrhagic retinitis. This report comes from the Department of Ophthalmology, Peking Union Medical College, Peking, China.

The medical literature apparently contains no record of ocular changes occurring in cases of kala-azar. The writer wishes, therefore, to report the systematic ophthalmologic examination of twenty patients suffering from this disease in Peking.

Kala-azar<sup>1,2</sup> is a chronic or subacute febrile affection characterized by emaciation, anemia, progressive enlargement of the spleen and often of the liver and leucopenia. It is endemic in certain parts of the world, notably India, China, Southern Europe along the border of Mediterranean, Asia Minor, Arabia, Egypt, and South Africa. It is practically confined in its geographic distribution to the countries of the eastern hemisphere, being never known to occur in North or South America, except as brought in by immigrants to those regions. The disease did not attract the attention of the medical profession until 1882, when Clark reported one hundred and twenty cases in Garo Hills, India, regarding them as a form of malignant malaria. The term kala-azar, meaning black sickness, was first used by the natives of the Garo Hills, on account of the dark appearance of the skin of such patients, and it is still in general usage today. It was not clear whether kala-azar was really a form of malaria, or whether it was a disease due to a specific cause until in 1900 Leishman discovered the etiologic agent in the spleen of a patient suffering from the disease. This was confirmed by Donovan in 1903. For want of an adequate scientific name the organism is generally called *Leishmania-donovani*, or

Leishman-Donovan body. It is a minute protozoon, oval or roundish in shape, measuring from two to four microns in diameter. In specimens stained with blood stains it has a faint blue protoplasm, containing two red chromatin masses, one larger than the other. The larger chromatin mass is the macronucleus, and the smaller the micronucleus. The organism, as it occurs in the human tissues, is nearly always within large mononuclear phagocytes.

In China kala-azar is most prevalent in the northeastern part of the country.<sup>3</sup> Both sexes are equally susceptible. The age of the patients ranges from one to fifty, but individuals between the ages of one and twenty are especially prone to the disease. A typical case of kala-azar has the following clinical picture: The patient is very anemic. He is debilitated and emaciated. There is either a continuous or remittent fever. Later, progressive enlargement of the abdomen develops due to an enlargement of the spleen and frequently of the liver as well. Altho in the majority of the cases the diagnosis is readily made on account of the characteristic history and physical examination, a definite conclusion cannot be drawn until the etiologic agent is found in the spleen, liver or peripheral blood.

The blood picture is characteristic in that it shows a leucopenia with an increase of large mononuclear leucocytes. In advanced cases the hemoglobin is low (15-30%), and the number of red blood corpuscles is markedly reduced (1-2 millions). The blood glob-

ulin precipitation test is strongly positive. In spite of such findings it must not be supposed that the diagnosis of kala-azar is always easy, as instances have occurred in which it was mistaken for typhoid or malaria. It has even been mistaken for schistosomiasis, ankylostomiasis, miliary tuberculosis, or syphilis. Cases of kala-azar which come under observation in

China are usually fairly well advanced, so that the probability of a wrong diagnosis is very small (See Table I).

The clinical course of kala-azar depends a great deal on the treatment. Cases which are not treated usually run a fatal course. In the Peking Union Medical College Hospital, potassium antimony tartrate in increasing

TABLE I.  
BLOOD FINDINGS.

| Case | Hospital No. | Sex | Age | R. B. C.  | W. B. C. | Hgb. | Hgb. Index | Poly. | Lymph. | L. Mono. | Eosin. | Baso. |
|------|--------------|-----|-----|-----------|----------|------|------------|-------|--------|----------|--------|-------|
| 1.   | 6370         | M   | 25  | 3,944,000 | 2,400    | 70%  | 0.9        | 53    | 43     | 3.5      | 0.5    | 0     |
| 2.   | 6520         | M   | 25  | 3,412,000 | 1,400    | 45%  | 0.7        | 45    | 32     | 12       | 0      | 0     |
| 3.   | 6128         | F   | 16  | 3,900,000 | 3,200    | 67%  | 0.9        | 40    | 50     | 10       | 0      | 0     |
| 4.   | 6157         | M   | 19  | 2,500,000 | 5,400    | 40%  | 0.8        | 42    | 42     | 16       | 0      | 0     |
| 5.   | 6778         | M   | 13  | 3,250,000 | 1,600    | 56%  | 0.9        | 54    | 38     | 8        | 0      | 0     |
| 6.   | 6642         | F   | 14  | 1,656,000 | 2,340    | 15%  | 0.5        | 50    | 45     | 4        | 1      | 0     |
| 7.   | 6785         | M   | 22  | 1,650,000 | 1,400    | 25%  | 0.75       | 50    | 44     | 6        | 0      | 0     |
| 8.   | 5821         | M   | 11  | 3,200,000 | 4,200    | 70%  | 1.09       | 62    | 24     | 8        | 3      | 1     |
| 9.   | 6759         | M   | 8   | 3,376,000 | 5,840    | 70%  | 1.06       | 55    | 41     | 4        | 0      | 0     |
| 10.  | 6651         | M   | 12  | 3,400,000 | 2,320    | 37%  | 0.54       | 54    | 36     | 10       | 0      | 0     |
| 11.  | 7343         | M   | 28  | 3,028,000 | 3,200    | 45%  | 0.75       | 51    | 42     | 3        | 4      | 0     |
| 12.  | 7350         | M   | 14  | 4,237,000 | 8,700    | 55%  | 0.65       | 80    | 20     | 0        | 0      | 0     |
| 13.  | 7199         | M   | 12  | 4,416,000 | 5,200    | 81%  | 0.63       | 56    | 37     | 6        | 1      | 0     |
| 14.  | 7236         | M   | 15  | 2,480,000 | 2,920    | 30%  | 0.63       | 88    | 12     | 0        | 0      | 0     |
| 15.  | 6910         | M   | 4   | 2,160,000 | 5,200    | 40%  | 0.97       | 56    | 36     | 8        | 0      | 0     |
| 16.  | 6991         | M   | 8   | 2,270,000 | 1,400    | 43%  | 0.97       | 45    | 46     | 8        | 1      | 0     |
| 17.  | 7537         | M   | 17  | 3,200,000 | 3,240    | 40%  | 0.62       | 54    | 36     | 8        | 2      | 0     |
| 18.  | 7522         | M   | 11  | 3,680,000 | 7,850    | 40%  | 0.55       | 75    | 20     | 5        | 0      | 0     |
| 19.  | 7492         | M   | 15  | 3,062,000 | 4,350    | 29%  | 0.48       | 44    | 53     | 3        | 0      | 0     |
| 20.  | 7565         | M   | 18  | 2,544,000 | 3,720    | 30%  | 0.60       | 62    | 36     | 1        | 1      | 0     |

doses is employed, given either intravenously or intramuscularly. In the majority of the cases a cure follows prolonged and careful treatment.

Certain complications may arise during the course of the disease, particularly in untreated cases, which may endanger the life of the patient. The most common complications are affections of the alimentary canal and res-

piratory tract, namely, cancrum oris, dysentery, bronchopneumonia, or tuberculosis.

Since November of 1923, in cooperation with the medical service of this hospital, the writer examined the eyes of twenty kala-azar in patients, paying special attention to the changes in the fundi (see table II).

In the series of twenty cases exam-

TABLE II.  
EYE FINDINGS.

| Vision                       | Lids                | Conjunctiva             | Cornea             | Iris           | Pupil               | Fundus                                           |
|------------------------------|---------------------|-------------------------|--------------------|----------------|---------------------|--------------------------------------------------|
| O.D. 6/4<br>O.S. 6/4-1       | Normal              | Normal                  | Clear              | Normal         | Reactions<br>Normal | Normal. Color of<br>vessels normal.              |
| O.D. 6/9-2<br>O.S. 6/6-2     | Normal              | Normal                  | Clear              | Normal         | Reactions<br>Normal | Normal. Color of<br>vessels normal.              |
| O.D. 6/15<br>O.S. 6/15-1     | Normal              | Folliculosis            | Clear              | Normal         | Reactions<br>Normal | Normal. Color of<br>vessels normal.              |
| O.D. 6/4<br>O.S. 6/4         | Normal              | Normal                  | Clear              | Normal         | Reactions<br>Normal | Normal. Color of<br>vessels normal.              |
| O.D. 6/10-4<br>O.S. 6/6-4    | Normal              | Slight<br>Pallor        | Clear              | Normal         | Reactions<br>Normal | Normal. Color of<br>vessels normal.              |
| O.D. 6/20<br>O.S. 6/60       | Normal              | Marked<br>Pallor        | Clear              | Normal         | Reactions<br>Normal | Retinal hemorrhages.<br>Art. pale. Vein dark.    |
| O.D. 6/7.5<br>O.S. 6/30      | Normal              | Slight<br>Pallor        | Clear              | Normal         | Reactions<br>Normal | Retinal hemorrhages.<br>Art. pale. Vein dark.    |
| O.D. 6/6-3<br>O.S. 6/6       | Normal              | Normal                  | Clear              | Normal         | Reactions<br>Normal | Normal. Color of<br>vessels normal.              |
| O.D. 6/7.5<br>O.S. 6/7.5     | Normal              | Normal                  | Clear              | Normal         | Reactions<br>Normal | Normal. Color of<br>vessels normal.              |
| O.D. 6/15<br>O.S. 6/20       | Normal              | Xerosis<br>Conjunctivae | Trachoma<br>Ulcers | Normal         | Reactions<br>Normal | Normal. Color of<br>vessels normal.              |
| O.D. 6/4-2<br>O.S. 6/4       | Normal              | Normal                  | Normal             | Normal         | Reactions<br>Normal | Normal. Color of<br>vessels normal.              |
| O.D. 6/15<br>O.S. 6/15       | Hordeolum           | Slight<br>Pallor        | Normal             | Normal         | Reactions<br>Normal | Normal. Color of<br>vessels normal.              |
| O.D. 6/6<br>O.S. 6/6         | Slight<br>Entropion | Normal                  | Normal             | Normal         | Reactions<br>Normal | Normal. Color of<br>vessels normal.              |
| O.D. 6/4<br>O.S. 6/4         | Normal              | Slight<br>Pallor        | Clear              | Normal         | Reactions<br>Normal | General pallor. Arter-<br>ies paler than normal. |
| Child cannot<br>cooperate.   | Normal              | Normal                  | Clear              | Normal         | Reactions<br>Normal | Normal. Color of<br>vessels normal.              |
| O.D. 6/7.5-1<br>O.S. 6/7.5-1 | Normal              | Normal                  | Clear              | Normal         | Reactions<br>Normal | Normal. Color of<br>vessels normal.              |
| O.D. 6/7.5<br>O.S. 6/6       | Normal              | Normal                  | Clear              | Normal         | Reactions<br>Normal | Normal. Color of<br>vessels normal.              |
| O.D. L.P.<br>O.S. L.P.       | Normal              | Xerosis                 | Kerato-<br>malacia | Not<br>visible | Not<br>visible      | Not visible.                                     |
| O.D. 6/7.5<br>O.S. 6/6       | Normal              | Moderate<br>Pallor      | Clear              | Normal         | Normal              | Normal. Color of<br>vessels normal.              |
| O.D. 6/6<br>O.S. 6/7.5       | Normal              | Moderate<br>Pallor      | Clear              | Normal         | Normal              | Normal. Color of<br>vessels normal.              |

ined, four patients showed definite changes in their eyes as follows:

1. *Pallor of conjunctiva.* It is a curious fact that anemia does not always show itself in the conjunctiva of these patients. As a rule, when the percentage of hemoglobin has fallen to thirty or less, the conjunctiva shows some pallor, but if the percentage is higher than forty, the pallor is hardly noticeable. In two cases, in which the percentage of hemoglobin was a little above fifty, such a pallor was seen. Such a discrepancy may be due to an irritation of the conjunctiva by dust, which produces a kind of subacute hyperemia or conjunctivitis—a very common occurrence in Peking. Such a condition may readily obscure a pallor of the conjunctiva due to anemia or other causes.

2. *Xerosis of conjunctiva.* This is a fairly frequent complication. In this series two cases of xerophthalmia were found:

CASE 1. A boy of twelve came in first as an eye patient on account of ulceration of cornea due to trachoma of a year's duration. Examination showed that the bulbar conjunctiva of both eyes was dry and appeared greasy. He was undernourished. Kala-azar was suspected and the patient was referred to the medical department. Puncture of the liver was made and many Leishman-Donovan bodies were found. His globulin precipitation test was positive (++++). Leucopenia and anemia were present. Both liver and spleen were enlarged. The xerosis disappeared in one month's time under kala-azar treatment.

CASE 2. A boy of eleven. Came in first as an eye patient on account of extensive ulceration of the cornea of both eyes, which had developed within a few days. On examination the corneae were found to be completely necrotic, with a central perforation, thru which a part of the iris was protruding. The bulbar conjunctiva was also very dry and greasy in appearance. The left eye was more extensively involved. On account of the intense pain and inflammation this eye was enucleated. This patient was also

suspected of having kala-azar, and was referred to the medical service. Leishman-Donovan bodies were found in the pulp of the spleen puncture. Globulin precipitation test was positive (++++).

This is undoubtedly a case of *keratomalacia* of both eyes complicating kala-azar. Marantic ulcer of the cornea is quite unlikely here, because this disease runs a chronic course and usually occurs in debilitating diseases of adults such as cirrhosis or carcinoma of liver.

3. *Fundus changes.* Two cases of hemorrhagic retinitis were found:

CASE 1. A girl, aged 14, came to the hospital on Nov. 23, 1923, with a history of general malaise and poor appetite of one year's duration. She had a progressive anemia and enlargement of the abdomen. The latter had been gradual and was of seven months' duration. A few days before admission she developed a cough accompanied by a "whitish sore" inside of her left cheek. For seven or eight months she had been steadily losing weight and strength. There was no history of spontaneous bleeding into the skin and mucous membranes. On examination the patient was found to be much emaciated. Her spleen and liver were enormously enlarged. No petechial spots were found on the body. Red blood corpuscles 1,656,000. White blood corpuscles 2,340. Hemoglobin 15%. Differential count: Polymorphonuclears 50%, Lymphocytes 45%, Large mononuclears 4%, Eosinophiles 1%, Basophiles 0. Spleen puncture positive for Leishman-Donovan bodies. Globulin precipitation test positive (++++).

Eye Examination: O. U. Conjunctiva markedly pale. Pupillary reactions normal.

Fundus Examination: O. D. Media clear; disc vertically oval, with a slightly blurred margin. Color of the disc normal. The part of the retina immediately surrounding the disc is grayish in color and is slightly edematous. The periphery of the retina is pale. There are several irregular areas of hemorrhage of various shapes, varying from one-third of a disc diameter to a whole disc diameter in size. They are found mostly along the bloodves-

sels, within two disc diameters from the disc margin, and are most marked along the superior nasal and inferior temporal vessels (PL XXI, O. D.). The hemorrhages below are nearer to the disc than the upper ones. Near the macular region a small area of hemorrhage is found. The hemorrhages are somewhat dark in color, and appear more or less flame like. Along the inferior temporal vein, at about a half disc diameter from the papilla, is the largest hemorrhagic patch. It is penetrated by this vein. The hemorrhage near the macular region, which is probably older than the others, shows a whitish center. The retinal arteries on the whole are paler than normal. The veins are very tortuous and dark red in color. The rest of the fundus is normal. Vision: 6/20.

O. S. Media clear. Disc is vertically oval and of normal color. Margin is slightly blurred. The retina around the disc is slightly edematous, and appears grayish in color. The periphery of the retina is paler than normal. Hemorrhagic patches are found in the retina (PL XXI, O. S.). They are irregular in shape, varying in size from half to a little over one disc diameter. They are chiefly found along the superior and inferior nasal, and along the inferior temporal vessels within two disc diameters from the papilla. The largest hemorrhagic patch is found between the disc and the macula, lying transversely across the papillomacular region. The fovea is almost totally obscured by the hemorrhage. The upper border of this patch of hemorrhage is almost straight, while its lower border is somewhat convex. The hemorrhages are dark red in color, and appear flame like. The retinal vessels are paler than normal. The veins are tortuous and dark red in color. No other changes are found. Vision: 6/60.

About one month later the hemorrhages with the exception of the largest ones had all disappeared in both fundi, leaving no traces of their former existence. There was no recurrence or development of fresh foci of hemorrhages. Vision was now O.U. 6/7.5. Red blood corpuscles 1,860,000. White

blood corpuscles 5,720. Hemoglobin 28%. The polynuclears had increased to 67%. The general condition of the patient was markedly improved.

CASE 2. A young man, aged 22, had been sick for two years. His illness began with continuous fever and night sweats. One month after the onset he felt a small hard lump in the left lower quadrant of his abdomen. The lump steadily increased in size. For five months previous to his admission he had had frequent bleeding from the nose and gums, and had been laid up for two months. He was pale but not much emaciated. His spleen was enormously enlarged, extending below the umbilicus. Liver was only slightly enlarged. No petechial spots were found on his body. Red blood corpuscles 1,650,000. White blood corpuscles 1,400. Hemoglobin 25%. Differential count: Polynuclears 50%, Lymphocytes 44%, Large mononuclears 6%, Eosinophiles 0, Basophiles 0. Liver puncture positive for Leishman-Donovan bodies. Globulin precipitation test was positive (++++).

Eye Examination: O.U. Conjunctiva slightly pale. Cornea clear. Pupillary reactions normal.

Fundus Examination: O.D. Media clear. Disc round. Margin regular and sharply defined. Color of disc normal. The retina adjacent to the disc is slightly edematous and grayish in color. The periphery is also paler than normal. Numerous irregular hemorrhagic patches varying in size from one-third to one disc diameter are found. They occur along or in close proximity to the bloodvessels, (chiefly the superior and inferior temporal vessels), (PL XXII, O.D.). A few are also found along the superior and inferior nasal vessels within three disc diameters of the margin of the disc. The macular region is free. The hemorrhagic patches are all flame like, except the one at the terminus of a branch of the inferior temporal artery, which is more or less roundish in shape and homogeneous in appearance. Five of the hemorrhagic patches possess a whitish center. In general, the hemorrhages are dark red in color. No other

pathologic changes are found. Vision: 6/7.5.

O.S. Media clear. Disc round and of normal color. Margin regular and sharply defined. The retina immediately surrounding the disc is slightly edematous and grayish in color. Numerous irregular hemorrhagic patches are found along the bloodvessels. In the vicinity of the inferior nasal vessels no hemorrhages are found. The hemorrhages are confined to an area within four disc diameters from the disc. They vary in size from one-fourth to two disc diameters. The majority of them are globular and homogeneous. One of them almost completely covers the fovea, and is pear shaped. One of these hemorrhages has a peculiar relation to a bloodvessel. It is found about three-fourths of a disc diameter from the nasal border of the disc, lying in the horizontal meridian beneath the lower border of a vein. It appears to project from the wall of this vein like an aneurysm. It has a darker color than that of the other hemorrhagic patches. Only two or three of the hemorrhagic patches show a whitish center. The retinal arteries are paler than normal. The veins are dark red. No other pathologic lesions are found. Vision: 6/30 (Plate XXII, O. S.).

Twelve days after the first examination only three hemorrhagic patches remained in the retina of the right eye, while in the left eye only one remained, namely, the one that appeared like an aneurysm on the nasal side of the disc. Vision was O.D. 6/4—3, O.S. 6/20—1. In spite of treatment the quality of his blood did not improve very much until three months later, when his red blood corpuscles had increased to 4,750,000, white blood corpuscles to 6,300, and hemoglobin to 60%. His general condition was remarkably improved.

These two cases of kala-azar that showed hemorrhages in the retina were accompanied by a very marked secondary anemia, while the other eighteen cases which did not show any hemorrhage in the retina were less anemic. It seems therefore that in cases of kala-azar there is a definite relation between retinal hemorrhages and the degree of anemia. A slight improvement in the quality of the blood, especially in regard to hemoglobin, seems to be sufficient to promote a rapid absorption of the blood and to prevent a recurrence of the hemorrhages as well as a development of fresh ones. It is difficult to explain why the hemorrhages in such fundi are so dark in spite of the high degree of anemia.

#### REFERENCES.

1. Manson's Tropical Diseases, 1921, p. 147.
2. Nelson's Loose Leaf Medicine, 1919, p. 1289.
3. Young, C. W. China Med. Jour., 1923, v. 37, p. 797.

## OCULAR FINDINGS IN KALA-AZAR IN CENTRAL CHINA.

T. P. LEE, M.D.

PEKING, CHINA.

For a wider study in the ocular findings in kala-azar the writer went to Central China to study the eye lesions in connection with other studies being made of 140 cases. Statistics of these cases are presented and detailed reports of 4 cases in which retinal hemorrhages were observed. From the Department of Ophthalmology, Peking Union Medical College, Peking, China.

Since hemorrhagic retinitis was found in two out of twenty cases of kala-azar examined in the Peking Union Medical College Hospital (see preceding article), it was thought worth while to control these findings by a study of a large number of cases of this disease. A study of such cases was therefore made in the Presbyterian Mission Kala-azar Station at Hsüchoufu, Kiangsu Province, where the Peking Union Medical College is conducting a field study of kala-azar under Dr. C. W. Young. One hundred and forty cases were examined in a period of nine days.

The class of patients examined at Hsüchoufu is in many respects distinctly different from that in the kala-azar clinic in Peking. For this reason, it seems advisable to give a brief account of these patients.

In the first place, the kala-azar patients at Hsüchoufu are all outpatients. They come from different villages in the vicinity, and many have to travel distances of from ten to twelve miles to attend the clinic. On account of the greater number of male patients, these are seen daily except Sunday, while the female cases are seen on Tuesday, Thursday and Saturday. Each morning from 9 to 11 o'clock fifty to seventy patients attend the clinic. Children are seen in either the men's or the women's clinic.

Secondly, except for a blood globulin precipitation test, no laboratory examination, such as blood counting or hemoglobin estimation is attempted. This is due to the enormous number of patients whom the doctors of the mission hospital are called upon to see.

Thirdly, no facilities are provided in this hospital for the examination of eyes. Consequently, the ophthalmologic examination was conducted in an improvised dark room. The procedure was limited to an external examination

and ophthalmoscopy. These examinations had to be made before, or immediately after, the patients had received their injections, because many of them were not at all eager to stay for any eye examination.

Because of these handicaps, this survey must be considered as a preliminary study. It may serve, however, as a stimulus to further investigations of the ocular changes in this disease by men who have to deal with kala-azar in other parts of the world.

### STATISTICAL DATA.

#### 1. General: 1. Age of patients examined:

Under 10, 38 cases  
10 to 19, 56 cases  
20 to 29, 34 cases  
30 to 39, 11 cases  
40 to 49, 0 case  
50 to 60, 1 case

2. Sex: Male, 120; female, 20.

#### 3. Duration of disease: 2 months to 4 years.

4. Number of injections: 1 to 80 (6 cases had none). The drug used in the treatment of kala-azar at Hsüchoufu is potassium antimony tartrate given intravenously in ascending doses of 0.5 c.c. to 5. c.c. of a 2% aqueous solution. When convalescence sets in the dosage is gradually decreased.

### II. Ocular Findings:

#### A. External Examination.

| Region         | Kala-Azar                                                      | Other Eye Diseases                                                                   |
|----------------|----------------------------------------------------------------|--------------------------------------------------------------------------------------|
| 1. Lids        | Edema 2                                                        |                                                                                      |
| 2. Conjunctiva | Marked pallor 10<br>Subconjunctival hemorrhage 2<br>Jaundice 1 | Trachoma 15<br>Folliculosis 2<br>Nevus 1<br>Pterygium 1                              |
| 3. Cornea      |                                                                | Adherent leucoma 1<br>Macula 8<br>Pannus 1<br>Phthisis bulbi 1<br>Total staphyloma 1 |
| 4. Pupils      |                                                                | Nevus of iris 1<br>Mydriasis (Chinese medicine) 1                                    |

## B. Fundus Examination.

| Region                | Kala-Azar                               | Other Eye Diseases   |
|-----------------------|-----------------------------------------|----------------------|
| 1. Lens               |                                         | Incipient cataract 1 |
| 2. Media (refraction) |                                         | High myopia 1        |
| 3. Retina             | Hemorrhages 4<br>Veins unusually dark 9 |                      |

## RETINAL HEMORRHAGES.

The retinal hemorrhages found in four patients were multiple. The details of these cases were as follows:

CASE 1. Male, 24 years of age, has had kala-azar for over a year, and has received five injections of potassium antimony tartrate. He appears weak and looks pale. Globulin precipitation test is positive. The lids, corneae, and pupils are normal. A small subconjunctival hemorrhage is found in the middle of the palpebral conjunctiva of the left lower lid.

*Fundus Examination:* O.D. Media clear. Disc is slightly vertically oval, margin regular and well defined, color normal. Four small areas of hemorrhage, rather dark red in color, are present around the disc: (a) a small spindle shaped hemorrhage lying about one-fourth d.d. (disc diameter) away from the upper nasal disc margin; (b) a small, roughly rectangular area of hemorrhage lying radially from the disc margin at 4 o'clock; (c) a roundish area of hemorrhage about the size of the disc almost one d.d. from the disc margin at 7 o'clock. (In this hemorrhage the course of a vein is interrupted. The outline of the hemorrhage is not very distinct but fades into the surrounding retina.) (d) a pear shaped hemorrhage half as large as the disc about one-fourth d.d. from the upper temporal quadrant of the disc margin. The blood vessels are normal but the veins are especially dark in color. O.S. Normal findings.

CASE 2. Male, 34 years of age, has had kala-azar for one and a half years. He has received eleven injections. Patient looks very pale but not weak.

Globulin precipitation test positive. The lids, corneae, and pupils are normal. A small subconjunctival hemorrhage is present in the left lower lid.

*Fundus Examination:* O.D. Media clear. Disc is slightly vertically oval with a regular but slightly blurred margin. Disc color is normal. Lying in the nasal part of the disc is a small area of hemorrhage. Extending from the disc margin between 12 to 1 o'clock, there is another hemorrhage, about one-half the size of the disc. This is rather pale in color and sharply defined. A third hemorrhage, seemingly a very recent one by its bright red color, is seen just below the disc. It is larger than the disc and is fairly well defined. A fourth hemorrhage is found one-fourth d.d. from the upper temporal margin of the disc, which is quite pale in color and is about one-half the size of the disc. All these areas of hemorrhage are closely related to the blood vessels, which appear normal. O.S. Media clear. The disc is almost round with a regular and well defined margin. Disc is normal in color. On the nasal side of the disc, about one d.d. from it, a small hemorrhage is found measuring about one third the size of the disc. Blood vessels are normal.

CASE 3. Male, 26 years of age, has suffered from kala-azar for one and a half years. He has received only three treatments, being a new patient at the clinic. He also looks very pale and weak. His globulin precipitation test is positive. External examination; lids are normal; conjunctivas are markedly injected; corneae are clear and pupils are normal.

*Fundus Examination:* O.D. Media clear. Disc is almost round and of good color; its margin is regular and well defined. A triangular patch of old hemorrhage is seen on the temporal half of the disc, extending horizontally from the center of the disc, in which its apex lies, toward the temporal side with the base in the adjacent retina. Minute black spots are seen in this hemorrhage. These are undoubtedly particles of blood pigment. Blood vessels are normal.

O. S. Fundus normal.

CASE 4. Male, 24 years of age, states that he has had kala-azar for about one year, and has received eight injections of antimony. His general appearance closely resembles that of the three cases mentioned above. His globulin precipitation test is also positive. External examination is negative.

*Fundus Examination:* O.D. Media clear. The disc is almost round with a regular and well defined margin and normal color. There are three areas of hemorrhage in the retina, the general characteristics of which resemble closely those found in the other cases. Blood vessels are normal. O. S. Media clear. Disc is slightly vertically oval, margin regular and well defined, color normal. Four areas of hemorrhage are found in the fundus, apparently rather recent. Blood vessels are normal.

#### DISCUSSION.

From these data it will be seen that hemorrhages are the most important ocular manifestation of kala-azar. The patients with retinal hemorrhages had a marked anemia. They appeared sallow and weak. It is interesting to note that none of them complained of disturbance of vision. These cases had had very few treatments, as compared with the majority of cases examined. The fact that retinal hemorrhages are not usually present in cases of kala-azar which have had a prolonged course of treatment with antimony agrees very well with the observations made in Peking. It has been noticed also that when patients have had a thoro course of treatment and are convalescing, their anemia disappears, their nutrition improves, and a cure is the rule in the majority of treated cases.

The subconjunctival hemorrhage

seems to be a complication resulting from the treatment of kala-azar. Its occurrence may be explained by the fact that the drug used for the treatment of this disease is a powerful expectorant, for sometimes, immediately after the injection of the drug, the patients cough severely for several minutes and expectorate copiously. In some children vomiting is produced soon after treatment. The examination is often interrupted by these paroxysms of coughing and expectoration. Undoubtedly these attacks are the immediate occasion of the subconjunctival hemorrhage; instances of this are found in children suffering from whooping cough, or in old people with bronchial affections.

#### SUMMARY.

1. Retinal hemorrhages were found in four out of one hundred and forty cases of kala-azar. Two of the patients with retinal hemorrhage also had subconjunctival hemorrhage.

2. Retinal hemorrhages are the most important ocular manifestation in kala-azar. They are usually multiple and closely related to the bloodvessels of the retina, around the disc.

3. Subconjunctival hemorrhages are probably a result of the treatment of kala-azar rather than a direct manifestation of the disease itself, the expectorant property of the drug used in the treatment being responsible for their occurrence.

4. The four patients with retinal hemorrhage and marked anemia had had very few treatments. Patients having had a prolonged course of treatment have only mild anemia and ocular changes are absent. Marked anemia is undoubtedly a factor in the occurrence of retinal hemorrhages.

## IMPORTANCE OF TESTING OCULAR MUSCLES IN THE DIAGNOSTIC DIRECTIONS.

F. H. LEE, M. D.

RICHMOND, VA.

Each muscle should be tested in the direction of its maximum action as the superior rectus, up and out, the inferior rectus, down and out. In such directions the effects on movements of either spasm or paralysis become most evident. Such testing is illustrated for the various defects of ocular movements. There is also some discussion of treatment of these conditions. Read before the Eye, Ear, Nose and Throat Society of Richmond, Va., March 20, 1923.

I have attempted to measure the angle thru which the optic axis passes to get into the line of main action of the vertically acting recti muscles; and present this as a means of laying stress on important factors which I believe are occasionally underestimated, and which promote accuracy and ease in muscle testing. To this end a resumé of motor anomalies is given.

In the routine examination of the eyes, certain tests for ocular motor anomalies should be included. To make these tests of full value it is necessary to hold a composite view of the subject; which can be done well by realizing the principles involved, and by application of these principles in the routine examination thru the necessary, tho limited, number of accurate tests, bearing in mind the commoner forms of muscle anomalies.

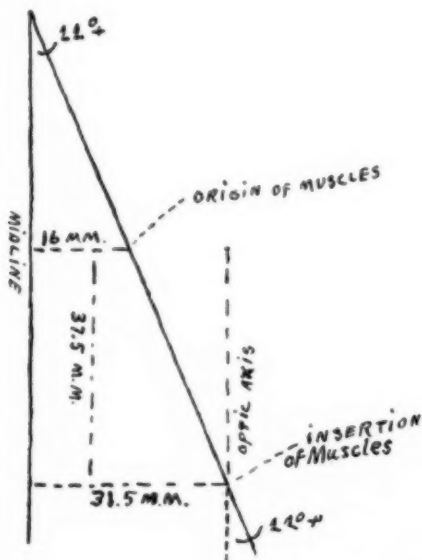


Fig. 1.—Relation of plane of action of vertical recti muscles, to mid plane of head in primary position.

Of the principles involved, the anatomy should be known from a physiologic viewpoint. Here I want to lay stress on the action of the superior and inferior recti muscles. The inner and outer walls of the orbit are respectively parallel to and divergent from the median line. The optic foramen, with the origins of the recti muscles, is only about one millimeter from the inner wall. The insertions of the superior and inferior recti muscles are about sixteen mm. from the inner wall. The angle that the line of these two muscles forms with the inner wall is evident, and it is also evident that the optic axis, when the eye is in the primary position and practically parallel with the inner wall, must rotate outward equally to be parallel with the line of major action of the superior or inferior recti muscles. I believe when put into practice this is not always realized, and these muscles are sometimes tested by requesting the patient to look up or down. The major actions of the obliques are more readily seen when compared with the foregoing, and those of the internal and external recti are simple.

The law of projection should be known and fusion understood.

In testing an ocular muscle it should be tested under its main or major action, for not only can diagnoses of all anomalies be made by testing ocular muscles under their major actions, but they can be made more surely and easily than if they are tested under any other action. If they are tested in a direction which weakens their major actions they are put to a disadvantage, per se, and receive aid from other muscles; for as the eye leaves the field of major action of one muscle, it enters the field of major action of some other

muscle. The secondary actions of a muscle are its weakest actions, and furthermore take place while some other muscle is acting predominantly. Consequently the complication of secondary actions, which adds little until the subject as a whole is understood, is not justified. A muscle acts predominantly when the optic axis is in, or nearly in, the plane of the line of the muscle.

The angles that the vertically acting recti make with the median line in the horizontal plane, when the eye is in the primary position, and when the

atic eye with an anteroposterior diameter of 24.5 mm. From its upper and lower corneal margins the sclera was intersected by arcs of circles of 7.7 and 6.5 mm. radii of curvatures respectively. These two points were connected and where the line crossed the sagittal axis was taken as a mean point of insertion in the anteroposterior plane. This lay 8.5 mm. behind the apex of the cornea.

According to Jackson, in the male, the apex of the cornea lies 17 mm. in front of a base line connecting the most receding points of the external

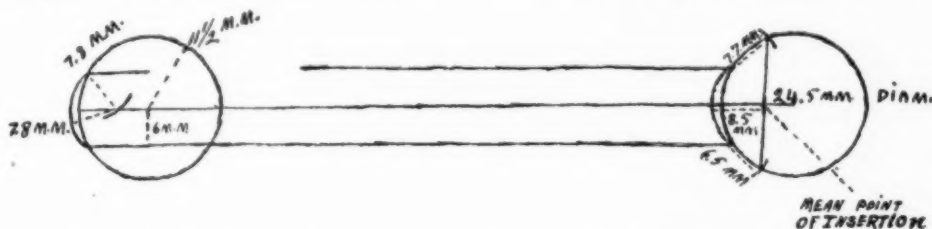


Fig. 2.—Diagram to show relation of mean point of insertion of muscles to apex of cornea.

muscles act predominantly, are 22, and 25 degrees respectively; and was arrived at in the following manner:

The mean point of insertion of the vertically acting recti in the anteroposterior plane lies 8.5 mm. behind the apex of the cornea. This theoretic approximation, which is reached by the method described, is sufficiently close for practical purpose.

A circle with a radius of curvature of  $11\frac{1}{2}$  mm. was described, and two points, one 6 mm. above, the other 6 mm. below the sagittal axis were extended forward and parallel to the sagittal axis until they intersected the circle. This gave the posterior limit of the cornea with a diameter of 12 mm. From this point of intersection an arc of a circle with a radius of curvature of 7.8 mm., the radius of curvature of the cornea, was drawn thru the sagittal axis, giving the center of the cornea; and from this point the extremities of the 12 mm. line were joined by an arc of a circle of 7.8 mm. radius of curvature, representing the cornea and adding to the 23 mm. diameter of the first circle  $1\frac{1}{2}$  mm., anteroposteriorly. This figure made a schem-

angles of the orbits, and the apex of the orbit lies 29 mm. behind this base line. From the foregoing the mean point of insertion of the muscles lies 8.5 mm. in front of the base line, or 37.5 mm. in front of the apex of the orbit. By measurements the notches for the origins of the two muscles were found to lie 16 mm. external to the median line, in the male. Using these figures two lines were drawn 37.5 mm. distant, and perpendicular to a line representing the median line. On one a point 16 mm., on the other a point 31.5 mm. from the median line were taken to represent the origins and insertions of the muscles respectively. (The interpupillary distance being 63 mm., and the insertions being in the vertical meridian.) A line passing thru these two points, and intersecting the meridian line, was taken to represent the angle of the line of the muscles with the midline, or any other line parallel to the midline, as the line of the optic axis when the eyes are in the primary position. This angle was found to be 22 degrees plus.

The figures below show the left eye when in the primary position, how the insertion of the muscle rotates out-

ward from I to I<sup>1</sup> when the eye is carried outward, and how the optic axis becomes in line with the line of the muscles. O—Origin of muscles, I—insertion of muscles, A—X optic axis, C—center of rotation.

EXPLANATION OF FIG. 3.

When the optic axis rotates outwards, the insertion of the muscles is carried outward, increasing this angle until the two lines coincide at the cen-

of the vertical meridian in directions opposite to their rotary actions in adduction.

No doubt these measures can be applied to the obliques, associates of the superior and inferior recti; tho it is evident here that the angle thru which the optic axis passes is greater than that given above if in binocular fixation consideration is given to the distance of the optic axis from that of the op-

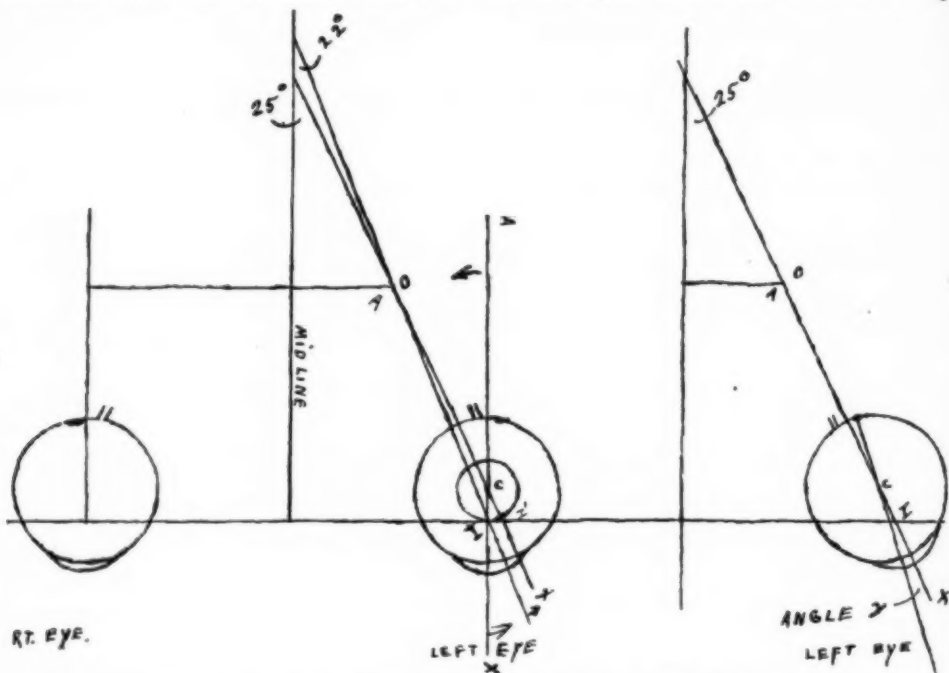


Fig. 3.—Relation of axis to plane of action of vertical recti muscles in different portions of eye.

ter of rotation; consequently this angle should be made by a line passing thru the center of rotation and the origin of the muscles, and measures 25 degrees. (The center of rotation lies 32.5 mm. in front of the apex of the orbit, and 31 mm. from the median line.) In these calculations the optic axis, and not the fixation line, has been taken; so under this angle of abduction, when the muscles are acting predominantly, that is in the oblique direction of the gaze, fixation would be less than 25 degrees horizontally, varying as angle gamma. If there is greater abduction, the line of the muscles would cross the center of rotation, and the muscles would become abductors and rotators

posite eye, and to convergence; for in the conjugate parallel oblique movements the object is always closer to the eye using the vertically acting recti stronger, that is stronger than the vertically acting recti of the opposite eye, and convergence is accomplished mainly with the eye using the obliques stronger. This requires the obliques to act thru a greater angle to associate with the vertically acting recti.

DIAGNOSTIC DIRECTIONS.

The diagnostic directions are the six gazes in which the twelve muscles are tested under their major actions, two muscles, one in each eye, being tested in each gaze. In that the six directions

test each one of the twelve muscles, they are properly termed diagnostic directions and must be realized as such. In directing the gaze in the directions, the words right and left should be used in preference to in and out. The directions are, eyes right, eyes up and right, eyes up and left, eyes left, eyes down and left, eyes down and right. For a closer correlation of the parts of the subject, I see no objection to convergence and divergence being thought of as directions of proximity and distance, and considered as adjunct diagnostic directions. The importance of these directions suggests this view.

In *noncomitant squint*, the main tests are for limitation of motion, or excessive motion in spasm; and the relation of the double images in diplopia, to find which the diplopia should be mapped on the tangent curtain. The diagnostic directions are used for both tests.

In *paralytic squint* there are two predominant and characteristic symptoms. The first is a limitation of motion in the field of major action of the paralyzed muscle. The second is an increasing diplopia in the field of major action of the paralyzed muscle. That it is an increasing diplopia, and not simply a diplopia, must be realized, for one is as important as the other for diagnosis; and practically all that is needed in acute cases. The common types of paralysis should be considered in some order, that they may be better recalled, as affections of the individual muscles or nerves. The tendency for noncomitant squint is to become comitant.

In *spasm* of the extrinsic ocular muscles, several types of which are presented, it is well to know that the most important is that which is secondary to a paralysis, as this is by far the most frequent type; and that the internal recti and inferior obliques are the most frequently affected muscles.

Errors of disjunctive movements may appear as errors of convergence or divergence, or as a combination of these, then one is usually secondary to the other; and under either they

may appear as an excess, insufficiency, or a paralysis. The characteristic feature, usually, is an increasing trouble in the field of action of the muscles, especially when the condition is primary, or has not been superimposed upon by a long standing secondary condition.

*Divergence excess* may appear as a primary, or a secondary condition. In the former it is congenital, tho it may not manifest itself in early life, and its cause is not known. The chief symptoms are exophoria or exotropia in divergence, and increased prism divergence. The common form, the secondary type, follows convergence insufficiency, and symptoms of the latter would predominate.

*Divergence insufficiency* may appear as a primary condition and is then usually of mild type. This mild form, tho not always primary, is the type which may successfully wear prisms laterally, base out. The chief symptoms are esophoria or esotropia in divergence, and low prism divergence. The common form, the secondary type, follows convergence excess, and symptoms of the latter would predominate.

Paralysis of divergence is frequently caused by lues and lethargic encephalitis. Its characteristic symptom is an acute homonymous diplopia increasing in the distance. Its importance is its indication of a central lesion.

*Convergence excess* may appear as a secondary condition, and is then secondary to divergence insufficiency. The primary and usual type may rarely be nonaccommodative, as in hysteria; but is usually accommodative, and is usually due to uncorrected hyperopia. The chief symptoms are esophoria or esotropia in convergence, and the near point of convergence closer than normal. Accommodative convergence excess with divergence insufficiency is the cause of most ordinary squints.

*Convergence insufficiency* may appear as a secondary condition and is then secondary to a divergence excess. The primary and usual type may be accommodative or nonaccommodative. The former is due mainly to uncorrected myopia, the latter to conditions which

lower the general health. The chief symptoms are exophoria or exotropia in convergence, and a remote near point of convergence. Convergence insufficiency with divergence excess is the cause of most divergent comitant squints. Paralysis of convergence is rare.

Of the foregoing I think the important things that are likely to be underestimated are first, the diagnostic directions, and second, that all conditions will give, as a rule, trouble that will increase in one or more of these directions, when convergence and divergence are considered as adjunct diagnostic directions.

The routine tests of disjunctive movements may be given as 1. The screen test, of which the binocular uncovering part is important. 2. The screen and parallax for distance. 3. Prism divergence. 4. Screen and parallax for near. 5. Near point of convergence. Other tests may be used either in place of or to confirm the above, as the Maddox rod, or the phorometer.

The normal limits of the disjunctive movements and of any tendency to deviate from binocular fixation should be known.

#### TREATMENT.

The treatment of acute paralysis should be directed towards the cause, and the annoyance from diplopia be relieved by covering the affected eye.

In Duane's syndrome, provided convergence is good, and in other old cases which have gone into comitant squint with an over acting antagonist, a partial tenotomy, or better a recession with scleral fixation of the antagonist should be done, and if necessary one of the advancement operations on the weak muscle. When there is a spastic inferior oblique, due either to a paresis of the opposite superior rectus or to a paralysis of the superior oblique, a free resection of the inferior oblique is indicated.

In primary divergence excess the treatment should be operative. If it is not a marked condition a tenotomy of one external rectus may be done,

and later, if necessary, a tenotomy of the other. If the condition is marked both should be done at one operation, and repeated if necessary.

In primary divergence insufficiency, provided it is of the mild type, prisms may be worn laterally. In the advanced cases an advancement of the externus may be done.

In accommodative convergence excess, with hyperopia, one should correct the hyperopia. If there should be myopia, under correct it. If after a number of months, there should be no improvement a partial tenotomy of the internus is indicated.

In accommodative convergence insufficiency, the proper glasses should be worn. In nonaccommodative convergence insufficiency, any condition that may lower the general health should be treated. In selected cases, prism exercises may help. The instructions here should be definite, or the patient will not carry them out.

The vertical diplopias are usually due to pareses, especially those above two prism diopters. Most cases are under six diopters and can be given prisms, to within one-half of the amount, to wear constantly, increasing the strength later if necessary.

Muscle recession with scleral fixation, as devised by Dr. P. C. Jameson, of Brooklyn, N. Y., and published in the Archives of Ophthalmology, volume 2, number 5, 1922, is recommended for diminishing the action of an over acting internal or external rectus muscle. This operation has the great advantage of not only removing completely the insertion from a point of excessive action but with certainty fixes that insertion at any point desired. This partial tenotomy does not do.

One should remember that it is the patient who is being treated and not the condition, so where there are moderate errors which are not giving trouble, one should not attempt to rectify them, unless thru some simple procedure, and then only in cases where there is reason to think the condition may get worse.

# EFFECT OF BRIGHTNESS OF PREEXPOSURE AND SURROUNDING FIELD ON BREADTH AND SHAPE OF THE COLOR FIELDS FOR STIMULI OF DIFFERENT SIZES.

PROF. C. E. FERREE and GERTRUDE RAND, PH. D.

BRYN MAWR COLLEGE.

These factors affect the results of field studies made at different times on the same person, or those upon different persons. They make the color stimulus seem lighter or darker, more or less saturated according to the induction by the surrounding field and the after image left by preexposure. Impressions on the periphery of the retina are particularly affected by these factors. The effect is very greatly influenced by the size or visual angle of the stimulus. This work has been done in the Department of Psychology, Bryn Mawr College.

## INTRODUCTION.

Two sets of factors lead to variable results in field study: (a) those affecting the results for a given observer, and (b) those tending to give a different result for different observers. The second group includes all of the first and several factors in addition. Without suitable control of the first group the advance or recession of a pathologic condition can not be checked up with the needed degree of precision, and without control of both the first and the second group the satisfactory use of field study in diagnosis presents difficulties.

We have already published considerable data on the effect of the factors of the first group and have described devices and methods for the control of these factors<sup>1</sup>. The factors of the second group will be taken up in later papers. It will be the special purpose of the present paper to show the effect of brightness of preexposure and surrounding field on the size and shape of the color fields, and the differences in effect when the fields are mapped with stimuli of different sizes. A detailed statement of the effect of these two factors on the amount of the chromatic response has been given in earlier papers<sup>2</sup>. A brief explanation and statement of principles will suffice here.

1. When a small colored stimulus surrounded by a field, for example of white or black, is viewed, a sensation is given which consists of the color mixed with black, or white, due to a contrast sensation induced from the surrounding field. The effect of fusing a color with black or white is two-fold. (a) There is a quantitative effect, due to the inhibition of the

chromatic excitation by the achromatic. In general, in the central retina at medium and high illuminations, white inhibits the colors most, the grays in order from light to dark next, and black the least.

Also the amount of the inhibitive action varies with the different colors, with the part of the retina at which the stimulation takes place, and with the state of brightness adaptation of the retina. The amount of induction depends upon the difference in brightness between the stimulus and the surrounding field; it increases with the distance from the fovea and with decrease in the general illumination; and with a given difference in brightness between the stimulus and the surrounding field, it is greater with a white than with black field,—also the amount of increase of induction, with decrease of illumination and with distance from the fovea, is greater with a white than with a black field.

There is also (b) a qualitative effect. The hue of certain colors is changed by the action of the achromatic excitation. This effect also varies with state of adaptation of the retina and part of the retina stimulated. In central vision the change is greatest when the stimuli are blue and yellow. For example, in case of the light adapted eye, yellow, when mixed with black in central vision gives a greenish yellow, which with the right proportion of components may become an olive green; the blue, when mixed with white or light gray, gives a sensation of reddish blue. In peripheral vision the changes in hue are greater in amount and not always in the same direction as for central vision, and oc-

cur for other colors besides blue and yellow.

2. When making the color observation in the peripheral retina, the observer is given a short period of preparation before the stimulus is exposed, in which to obtain and hold a steady and accurate fixation. This introduces the factor of preexposure, for during this period of preparation the area which is to be stimulated by color receives a previous stimulation. This previous stimulation, when it differs in brightness from the color, gives a brightness after image, which mixes with the color sensation and both reduces its saturation and modifies its color tone. If the preexposure is lighter than the stimulus color it adds, by after image, a certain amount of black to the succeeding color impression; if darker, it adds a certain amount of white. Since both white and black, as after effect reduced the sensitivity to color, the eye is rendered more sensitive when no after image is given, that is when the preexposure is of the same brightness as the color. The preexposure should, therefore, be a gray of the brightness of the color. No brightness after image will then be added to the succeeding color impression to modify either its saturation or color tone. The only brightness change acting upon it will be due to the slight adaptation to this gray, during the short time of preexposure.

The general principle then is clear. There remains only to explain why in the peripheral retina the short preexposure which takes place while the eye is obtaining a steady fixation has so much effect on the color stimulation immediately following. Two reasons are found for this. (a) The after image reaction of the peripheral retina is extremely quick. While some slight variation is found at different angles of excentricity, in general the peripheral after image seems to reach its maximal intensity with a few seconds of stimulation. This amount of time is usually consumed in obtaining fixation and preparing for the stimulation; hence in each observation there is fused with the color sensation about as strong a

brightness after image as can be aroused. For this reason alone it is readily seen why the brightness of the preexposure is of so much greater consequence in the peripheral than in the central retina where the maximal intensity of after image is, roughly speaking, obtained from a stimulation of 40-60 seconds or longer. (b) There is apparently no latent period in case of the peripheral after image. It flashes out at full intensity immediately upon the cessation of the stimulation. Thus there is no possibility of escaping the full effect of the brightness after image on the stimulus color as might happen in the central retina where the latent period obtains, if there were a very short exposure to the stimulus color.

A word might be added also in explanation of the difference in effect for colored stimuli of different sizes. In general a decrease in the size of the stimulus adds to the sensitivity of the perimetric method, or increases the ability to pick up the effect of any factor or condition, normal or pathologic. For example, a given pathologic condition causes a greater shrinkage of the field when mapped with small than with large stimuli. That is, a smaller amount of defect or disturbance in sensitivity can be picked up with a small than a large stimulus. One reason for this is that the use of the smaller stimulus results in a contraction of the field thus bringing the limits into that part of the retina in which sensitivity falls off more gradually, and in which part therefore a given effect on the color response produces a greater amount of contraction of the field. Another reason, as applying to the effect of brightness of the surrounding field, is that there is more intensive achromatic induction over the smaller stimulus, i.e., the amount of induction is influenced by the ratio of area of inducing surface to area of surface over which the induction occurs.

As has already been indicated, the effect of brightness of preexposure and surrounding field falls under the general heading of the inhibitive action of the achromatic excitation on the

chromatic. This action takes place however the achromatic excitation is aroused,—by the admixture of white light, by after image, by contrast, etc. It may be strikingly and conveniently demonstrated to large numbers at once, in the following lecture room experiments which we have used for many years. (a) Set up side by side on three mixers discs made up of  $180^\circ$  of color, e.g., blue, and  $180^\circ$  of white;  $180^\circ$  of blue and  $180^\circ$  of gray, of the brightness of the blue; and  $180^\circ$  of blue and  $180^\circ$  of black. When mixed, altho the eye receives the same amount of colored light from each set of discs, the mixture with black seems to have lost but very little color; the mixture with white is a lavender with but little color; and the mixture with gray of the brightness of the color, in this case a very dark gray, is less saturated than the mixture with black. When different grays are used the saturation decreases apparently in graded steps as white is approached. The demonstration can be made on a single color mixer by compounding the color disc with white, black and gray discs of different breadths or radii. When rotated this gives the effect of a surface made up of three concentric zones or rings, one in which the color is mixed with white, one with gray and the third with black. The demonstration may be made roughly quantitative by determining the proportions of color required to give the chromatic threshold in black, white and grays; also by determining the proportions of color and the achromatic series to give equal saturations.

(b) Prepare a preexposure surface, half white and half black, 50x60 cm. Expose the eye 15 to 20 seconds and project the after image on a colored surface, e.g., blue, of the same dimensions. The half of the field preexposed to black will appear a very pale unsaturated lavender while the half preexposed to white will be a dark strongly saturated blue, altho the eye receives the same amount of light from both halves of the field. As the after image dies away the two halves of the field become more and more nearly

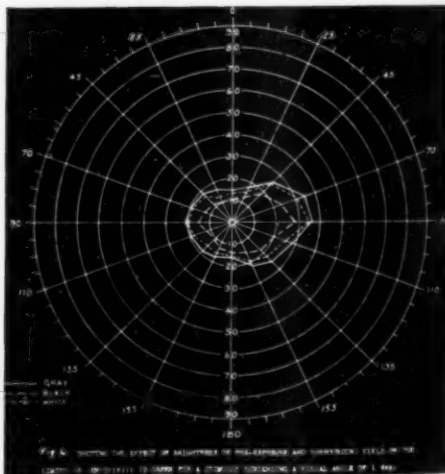
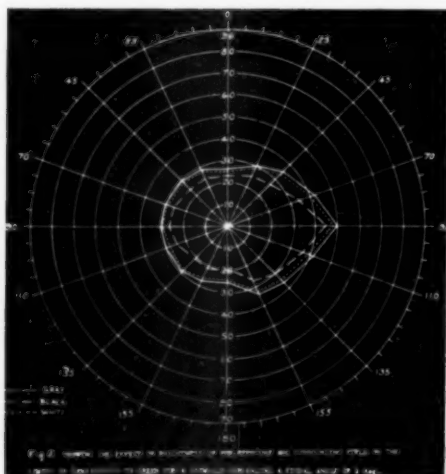
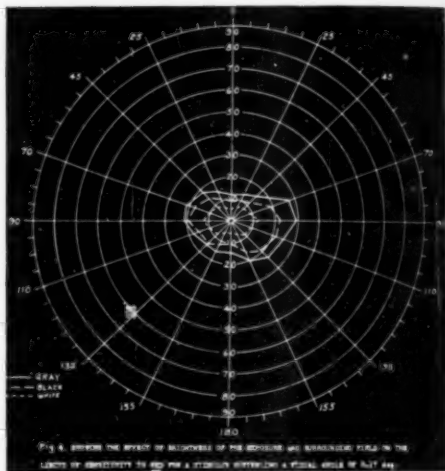
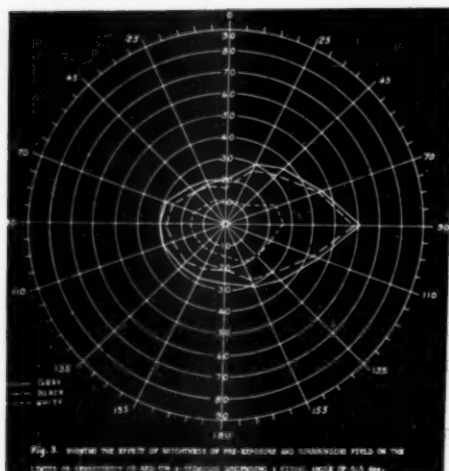
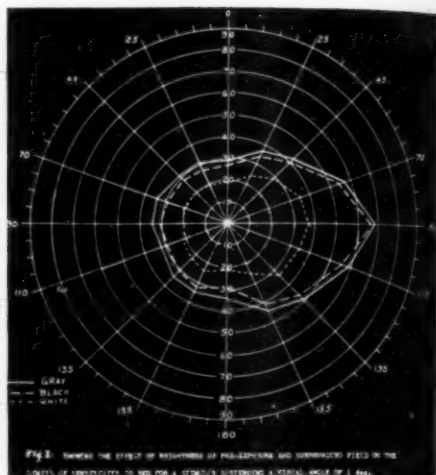
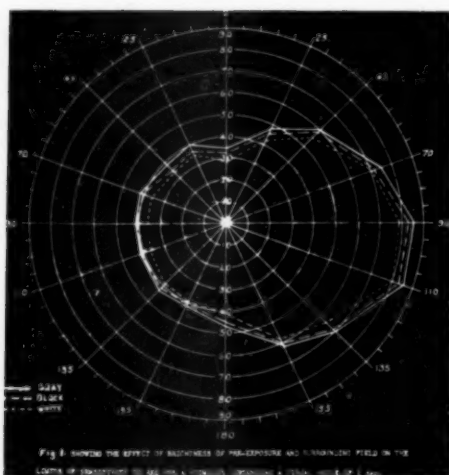
alike in saturation and color tone. If desired, the preexposure surface may be made of white, black and a series of graded grays, appropriately arranged. When this is done, the graded loss in saturation due to the different brightnesses of the after image may be observed. This demonstration also may be made quantitative by finding the threshold of color after the eye has been preexposed for 15 to 20 seconds to white, black and the grays.

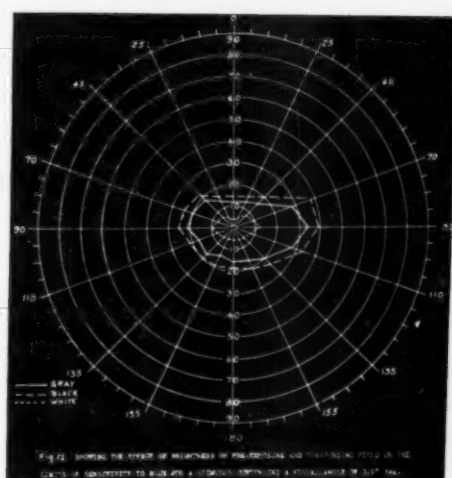
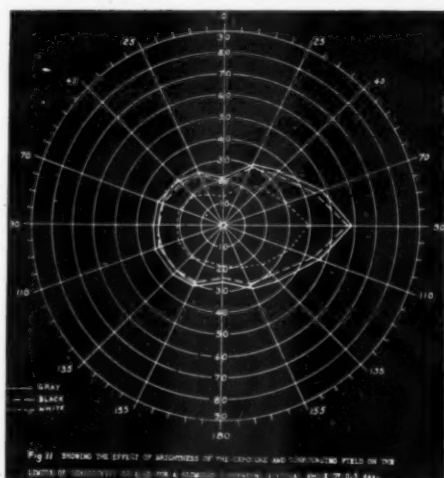
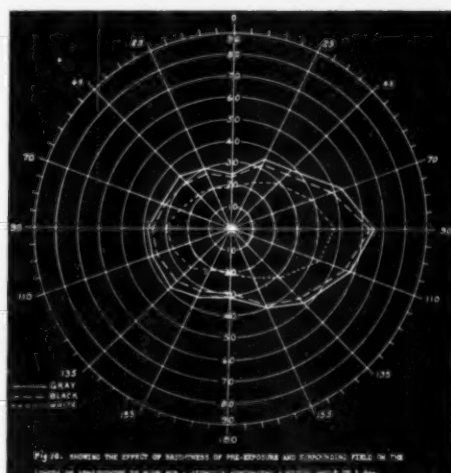
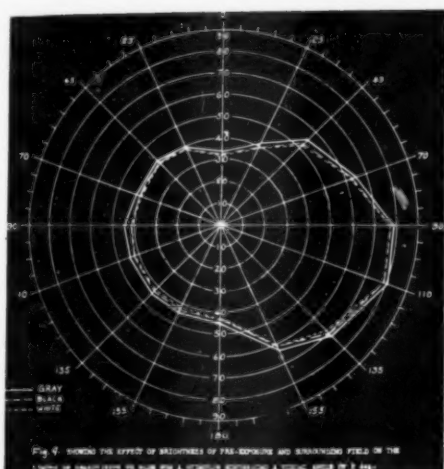
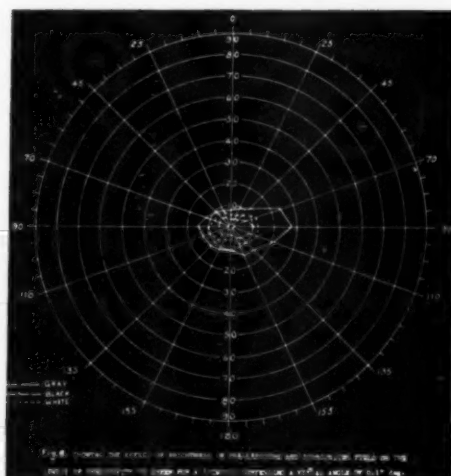
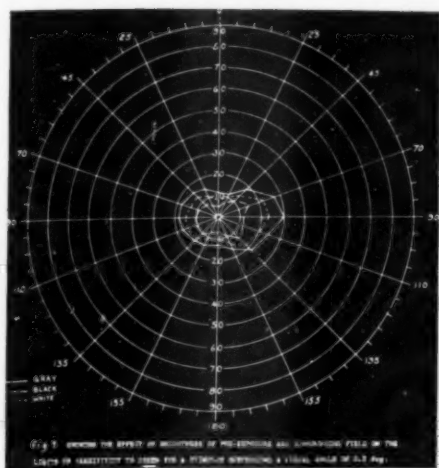
(c) Prepare contrast discs with narrow rings of color and inside and outside surfaces of black, white and a gray of the brightness of the color, respectively. Set up on color mixers side by side and rotate to smooth out all margins. The colors are lightened and darkened respectively by contrast induced by the black and white fields. The effect of these achromatic excitations on the hue and saturations of the colors is similar to that obtained in the former experiments. A more striking effect is produced if a mixed color, e.g., orange, is used. The quantitative features noted above can also be utilized in this demonstration, by employing for the contrast ring in each case, a gray of the brightness of the color and enough of the color to give the threshold of color sensation when acted upon by the white and black inductions.

The effect of induction and after image, it will be remembered, is not nearly so striking in the central as in the peripheral retina. Much more induction, with a given brightness difference between the inducing and the contrast field, for example, is produced in the peripheral retina; and only a short period of preexposure (2-3 seconds) is required to give a strong after image with no latent period.

#### CONDITIONS UNDER WHICH THE WORK WAS DONE.

The determinations were made on the perimeter described in earlier papers<sup>3</sup>. The illumination was kept constant at 7 foot-candles. Three brightness values were used as preexposure and surrounding field,—a white, a black and a gray of the brightness of the color at or near the point





at which the limits of sensitivity occur. The brightness value of the white at the intensity of illumination employed was 0.01367 cp. per sq. in.; of the black, 0.000567 cp. per sq. in. The grays needed to match the colors in brightness were selected from the Hering series of pigment grays in which white is represented by number 1 and black by number 50. Inasmuch as the colors change their brightness when imaged at different degrees of excentricity from the fovea and the different sizes of stimulus carried the limits to different degrees of excentricity in the peripheral field, different grays were required to match the different sizes of stimuli at the limits of sensitivity. In some cases also these grays varied for the different meridians for the same color. The serial numbers of these grays, also their brightness in candle power per square inch under the intensity of illumination used, are given in Table I. The stimuli used were a red, green and blue of the Heidelberg series of pigment papers. The sizes employed subtended a visual angle at the eye of 2, 1, 0.5 and 0.17 degrees respectively.

## RESULTS.

The results obtained are shown in Figs. 1-12 and Tables II-IV.

A precise way of making a quantitative comparison of fields, for the sake of determining numerically the exact effect of any given factor, is to measure the areas of the fields plotted to a standard scale and determine the relations of these areas. The measurements can be made most conveniently by means of a planimeter. We have measured the areas of the fields shown in Figs. 1-12 when plotted to a scale of 1 mm. to 1 degree, and have determined in per cent the amount the field has been changed by each of the

Table I.

| Visual Angle (deg.) | Serial number | Red             |        | Green           |        | Blue            |        |
|---------------------|---------------|-----------------|--------|-----------------|--------|-----------------|--------|
|                     |               | Cp. pr. sq. in. | number | Cp. pr. sq. in. | number | Cp. pr. sq. in. | number |
| 2°                  | 41            | .00127          | { 6    | .00651          | { 33   | .00177          | { 33   |
|                     |               |                 | { 3    | .00883          | { 31   | .00195          | { 31   |
| 1°                  | 33            | .00177          | 7      | .00613          | 33     | .00177          | 33     |
| 0.5°                | 41            | .00127          | 7      | .00613          | 29     | .00214          | 29     |
| 0.17°               | 39            | .00161          | 5      | .00682          | 29     | .00214          | 29     |

\* Values specified in candle power per square inch may be converted into milli-lamberts by multiplying by 486.8.

Table II.

Showing the effect of brightness of preexposure and surrounding field on the size of the color field for red with stimuli subtending different visual angles. In this table the percentage reduction is computed on the largest field size as base.

| Visual Angle (deg.) | Area (sq. cm.) |       |       | Amount of Reduction (sq. cm.) |       |       | Percentage Reduction |       |       |
|---------------------|----------------|-------|-------|-------------------------------|-------|-------|----------------------|-------|-------|
|                     | Gray           | White | Black | Gray                          | White | Black | Gray                 | White | Black |
| 2°                  | 99.3           | 82.5  | 92.5  | ....                          | 16.8  | 5.8   | ....                 | 16.9  | 5.8   |
| 1°                  | 56.4           | 22.3  | 48.8  | ....                          | 34.1  | 7.6   | ....                 | 60.5  | 13.5  |
| 0.5°                | 37.4           | 9.2   | 30.0  | ....                          | 28.2  | 7.4   | ....                 | 75.4  | 19.8  |
| 0.17°               | 12.6           | 2.0   | 8.2   | ....                          | 10.6  | 4.4   | ....                 | 84.2  | 34.9  |

Table III.

Showing the effect of brightness of preexposure and surrounding field on the size of the color field for green with stimuli subtending different visual angles. In this table the percentage reduction is computed on the largest field size as base.

| Visual Angle (deg.) | Area (sq. cm.) |       |       | Amount of Reduction (sq. cm.) |       |       | Percentage Reduction |       |       |
|---------------------|----------------|-------|-------|-------------------------------|-------|-------|----------------------|-------|-------|
|                     | Gray           | White | Black | Gray                          | White | Black | Gray                 | White | Black |
| 2°                  | 36.0           | 33.3  | 25.0  | ....                          | 2.7   | 11.0  | ....                 | 7.5   | 30.6  |
| 1°                  | 16.8           | 13.1  | 8.2   | ....                          | 3.7   | 8.6   | ....                 | 22.0  | 51.2  |
| 0.5°                | 11.4           | 7.5   | 3.2   | ....                          | 3.9   | 8.2   | ....                 | 34.2  | 71.9  |
| 0.17°               | 6.5            | 2.5   | 1.1   | ....                          | 4.0   | 5.4   | ....                 | 61.5  | 83.1  |

Table IV.

Showing the effect of brightness of preexposure and surrounding field on the size of the color field for blue with stimuli subtending different visual angles. In this table the percentage reduction is computed on the largest field size as base.

| Visual Angle (deg.) | Area (sq. cm.) |       |       | Amount of Reduction (sq. cm.) |       |       | Percentage Reduction |       |       |
|---------------------|----------------|-------|-------|-------------------------------|-------|-------|----------------------|-------|-------|
|                     | Gray           | White | Black | Gray                          | White | Black | Gray                 | White | Black |
| 2°                  | 94.2           | 85.6  | 88.1  | ....                          | 8.6   | 6.1   | ....                 | 9.13  | 6.5   |
| 1°                  | 54.6           | 27.0  | 48.4  | ....                          | 27.6  | 6.2   | ....                 | 50.6  | 11.4  |
| 0.5°                | 40.25          | 17.9  | 34.8  | ....                          | 22.35 | 5.45  | ....                 | 55.3  | 13.5  |
| 0.17°               | 12.5           | 2.45  | 17.75 | 5.25                          | 15.30 | ....  | 29.6                 | 86.2  | ....  |

preexposures and surrounding fields for each size of stimulus, using the area of the widest field as the base on which to compute the percentage change. In Tables II-IV are given the sizes in sq. cm. of the various fields when plotted on a scale of 1 mm. to 1 degree, the amounts of reduction and the percentage of reduction. These results may be summarized as follows:

(1) The widest angular limits of the color zones were obtained when the preexposure and surrounding field were of the same brightness as the color for all of the colors except blue with the very small 0.17 deg. stimulus. With this stimulus the widest field was obtained with the black preexposure and surrounding field. This result is quite exceptional. It seems to be obtained only when very small stimuli are used. Usually the widest fields are obtained with a preexposure and surrounding field of the brightness of the color. Blue, however, sustains a very close qualitative relation to the gray of the Hering series which matches it in brightness. When very small in size it seems to escape observation entirely on such a background after a certain point of eccentricity is reached. For this reason the small amount of induction from the black background seems to be a favorable rather than an unfavorable factor. That is, the influence of this induction on rendering the stimulus more different from its background seems to more than compensate for the small amount of inhibitive action on the chromatic component of the sensation.

(2) With the white preexposure and surrounding field the size of the field for red with stimuli subtending visual angles of 2, 1, 0.5 and 0.17 deg. was reduced 16.9, 60.5, 75.4 and 84.2 per cent respectively; with the black preexposure and surrounding field, 5.8, 13.5, 19.8 and 34.9 per cent. With the white preexposure and surrounding field for green these reductions were respectively 7.5, 22, 34.2 and 61.5 per cent; with the black preexposure and surrounding field they were 30.6, 51.2, 71.9 and 83.1 per cent. With the white preexposure and surrounding field the

field for blue with stimuli subtending visual angles of 2, 1 and 0.5 deg., the reductions were 9.1, 50.6 and 55.3; with the black preexposure and surrounding field they were 6.5, 11.4 and 13.5. In the case of blue for the stimulus subtending a visual angle of 0.17 deg., as already stated, the field was widest for the black preexposure and surrounding field. The reduction produced by the gray preexposure and surrounding field was 29.6 per cent; by the white preexposure and surrounding field, 86.2 per cent.

(3) It will be noted that black as a preexposure and surrounding field contracts the limits more for the lightest color, green; and white for the darker colors, red and blue. The explanation for this difference in result is doubtless to be found in terms of the effect of the surrounding field. That is, the greater the brightness difference between the stimulus and its surrounding field the greater will be the induction effect and the greater its inhibitive action on the color.

As a plea for the adoption of better controls in the practice of perimetry it may not be out of place to add in conclusion the following comments. In general two types of method are available for determining the condition of a sense organ, the direct or objective examination and the functional test. Field study of every kind belongs to the latter type of examination. The following are some of the advantages of the functional test over any objective method of making the examination: (1) Perhaps the earliest manifestation of a pathologic condition of any organ is a disturbance of function. It usually comes before a change in structure. (2) In case of the eye the visual field represents a projection of the retina. This projection is magnified in direct ratio of the square of the distance to which it is made. Thru the application of the functional test in the study of the visual field, therefore, a much greater magnification can be secured than by any objective method of examining the nerve fiber layer of the retina or fundus,—that is, a much more minute and searching

examination can be made. And (3) as just stated the objective examination shows only the condition of the fundus. The condition of the deeper lying structures can not be revealed by it. The functional test furnishes evidence of the condition of the entire sensorium from retina to brain center.

It is obvious that there is great need to develop the possibilities of the functional test as a means of differential study and diagnosis. A sensitive and precise means of early diagnosis is, it scarcely need be pointed out, one of the most important adjuncts of preventive medicine.

#### REFERENCES.

1. Ferree, C. E., and Rand, G. Factors Which Influence the Color Sensitivity of the Peripheral Retina, *Trans. Amer. Ophthal. Soc.*, 1920, xviii, pp. 171-197.
- Ferree, C. E., and Rand, G. Some Contributions to the Science and Practice of Ophthalmology, *Transactions of an International Congress of Ophthalmology*, held in Washington, D. C., April, 1922, 36 pp.
- Ferree, C. E., and Rand, G. Perimetry: Variable Factors Influencing the Breadth of the Color Fields, *Amer. Jour. of Ophthal.*, 1922, v, pp. 886-895.
- Ferree, C. E., and Rand, G. The Effect of Intensity of Stimulus on the Size and Shape of the Color Fields and Their Order of Ranking as to Breadth, *Amer. Jour. of Ophthal.*, 1923, vi, pp. 453-460.
- Ferree, C. E., and Rand, G. Chromatic Thresholds of Sensation from Center to Periphery of the Retina and Their Bearing on Color Theory, Part I, *Psychol. Rev.*, 1919, xxvi, pp. 16-42; Part ii, *ibid*, pp. 150-163.
- Ferree, C. E., and Rand, G. The Absolute Limits of Color Sensitivity and the Effect of Intensity on the Apparent Limits, *Psych. Rev.*, 1920, xxvii, pp. 1-23.
- Ferree, C. E., and Rand, G. The Limits of Color Sensitivity: The Effect of the Brightness of the Preexposure and of the Surrounding Field, *Psych. Rev.*, 1920, xxvii, pp. 377-398.
- Rand, G. The Effect of Changes in the General Illumination of the Retina Upon Its Sensitivity to Color, *Psych. Rev.*, 1912, xix, pp. 463-490.
- Rand, G. The Factors Which Influence the Sensitivity of the Retina to Color: A Quantitative Study and Methods of Standardizing, *Psych. Monog.*, 1913, xv, 178 pp.
2. Ferree, C. E., and Rand, G. The Limits of Color Sensitivity: The Effect of the Brightness of the Preexposure and of the Surrounding Field, *Psych. Rev.*, 1920, xxvii, pp. 377-398.
- Ferree, C. E., and Rand, G. Factors Which Influence the Color Sensitivity of the Peripheral Retina, *Trans. Amer. Ophthal. Soc.*, 1920, xviii, pp. 171-197.
3. Ferree, C. E., and Rand, G. An Illuminated Perimeter with Campimeter Features, *Amer. Jour. of Ophthal.*, 1922, v, pp. 455-465.
- Ferree, C. E., and Rand, G. The Campperimeter: An Illuminated Perimeter with Campimeter Features, *Trans. Amer. Ophthal. Soc.*, 1920, xviii, pp. 160-179.

## THE USE OF ADRENALIN IN INCREASED INTRAOCULAR TENSION.

HARRY S. GRADLE, M. D.

CHICAGO, ILL.

This paper gives a brief summary of the recorded experience of others; and the writer's experience with adrenalin used to reduce intraocular tension. It also gives a technic for such use, and suggestions as to its method of action.

In the Fall of 1912, there appeared a few lines in the discussion of the question of intraocular tension, at some German ophthalmologic society, regarding the use of subconjunctival injections of adrenalin, in secondary or iritic glaucoma, with resultant depression of tension. I cannot find the name of the speaker or the exact reference to the quotation, but there is no question as to the date, for I had occasion a few days later to try the value of the drug used in that way and the record of my first injection is dated Oct. 21, 1912. Shortly before that, Rollet and Curtil (*Studies of Ocular Tonometry*, *Rév. Gén. d'Ophth.*, 1911, v. XXX, p. 481) had noted that the use of adrenalin, especially in inflamed eyes, sometimes provoked a surprising fall in intraocular tension. The writer, whose name I cannot find, reported that the subconjunctival injection of four to six minims of 1-1000 adrenalin, invariably and immediately, reduced the increased intraocular tension that occurs at times during the course of an iridocyclitis and permitted the further use of atropin without danger of hypertension. Evidently working entirely independently, Erdmann (*Subconjunctival Injection of Suprarenin Preparations*, *Klin. M. f. Augenh.* 1913, v. 52, p. 520, and *The Subconjunctival Injections of Suprarenin Preparations in Rabbits and the Therapeutic Use in Man*, *Zeit. f. Augenh.* 1914, v. 32, p. 216) found that continued injections could be made without damage to the eye. He noted the very rapid dilation of the pupil following the injection and found that posterior adhesions that defied instillations of atropin, could be broken up this way. However, he warned that the drug must not be used in hemorrhagic iritis and either not at all, or else with extreme caution, in glaucoma and glaucomatous iritis.

Then occurred a lapse of years without any publication bearing directly

upon this subject until Arnold Knapp (*Transactions American Ophthalmological Society*, 1921, p. 69) described the value of instillation of adrenalin into the conjunctival sac with resultant dilatation of the pupil as a diagnostic measure in glaucoma. The next year, Fromaget (*Retrobulbar Injections of Novocain and Adrenalin in Ocular Surgery*, *Ann. d'Ocul.*, 1922, v. 159, p. 575) started to anesthetize two cases of glaucoma for operation by injecting 3 c.c. of 2% novocain, containing 10% of 1-1000 adrenalin, into the retrobulbar muscle cone. About the time complete anesthesia appeared, the symptoms of the glaucoma disappeared. This led him to experiment, and he obtained the same effect in another case in which the injection was of adrenalin only. At the November 28, 1923, meeting of the Berlin Medical Society (reported in *Med. Klin.*, Dec., 1923), K. Hamburger reported upon the effect of subconjunctival injections of adrenalin. He used as much as  $\frac{1}{2}$  c.c. of the synthetic suprarenin HCl, and repeated the injection as often as two or three times in twenty-four hours. An enormous mydriasis appeared within three to four minutes, one that loosened synechiae better than atropin and lasted three or four hours. In normal eyes there was a marked decrease in intraocular tension that lasted from four to six days, and in glaucomatous eyes, if the injection was followed by a miotic, there was always a marked reduction of the tension. He insisted that the subconjunctival injection of adrenalin should always be tried after miotics had failed to control the tension in chronic glaucoma before resorting to operation.

The report of Hamburger led others to try the method which they reported at the next meeting of the Berlin Medical Society (Dec. 12, 1923, reported in *Med. Klin.*, 1924, Vol. 1, p. 31). Fehr tried

the subconjunctival injection of adrenalin in 16 cases and found the effect to last from two to eight days. He found it useful in assisting atropin in breaking adhesions, especially in iritis glaucomatosa. He further used it before operation in glaucoma when retinal hemorrhage was feared, replacing the posterior sclerotomy and advised its use to dilate the glaucoma pupil for ophthalmoscopic examination. Hegner injected adrenalin in five cases of glaucoma simplex and found a reduction of tension lasting on an average about eight days. In one case, the injection precipitated an attack of acute glaucoma (Hamburger reported a similar experience), but the attack was easily controlled with miotics. Eppenstein reported three cases with satisfactory results and two cases, one acute and one chronic, with no result. Polack confirmed Hamburger's findings in nine further cases.

Between 1912 and 1917, I injected adrenalin subconjunctivally in six cases of secondary glaucoma (the so-called iritis glaucomatosa) with immediate and permanent reduction of the hypertension in four. In the other two cases, the effect was not apparent. Then came the war and I forgot about this method of therapy until recently. Now I have been using it on every possible occasion and from the rather limited experience in sixteen cases, have arrived at the following conclusions:

*Acute Inflammatory or Congestive Glaucoma.* I have had no personal experience in this type of the disease, but at my suggestion, Dr. Richard Gamble (Trans. Chicago Ophthal. Society, April 21, 1924) injected adrenalin subconjunctivally in a case of this type with a tension well over 70 mm. Hg. An enormous mydriasis resulted before the patient was off the table and a very marked reduction in tension followed, so that within 24 hours, all congestive signs had disappeared. It would seem perfectly justified, therefore, in acute congestive glaucoma to inject 4 to 8 minims of 1-1000 adrenalin subconjunctivally, at the same time using a powerful miotic in the endeavor to eliminate the congestive phase of the disease before proceeding to operation. The injection may be repeated two or three times in twenty-

four hours, if the first is not successful. However, owing to the evanescent effect of the drug thus used, the procedure does not and cannot replace the operative procedure as a preventative measure against future attacks. All operators are agreed that an iridectomy can be performed more successfully in the absence of, rather than in the presence of, an acute congestive glaucoma, and if we are thus enabled to render an eye quiet before operating, we have made a decided step in advance.

*Chronic Inflammatory or Congestive Glaucoma.* In two cases of this type, adrenalin was injected subconjunctivally, once in one and twice in the other. In neither could any clinical reduction of the hypertension be found. It rather stands to reason that a result could not be obtained in this class of cases where there is a very firm anterior peripheric iris adhesion and where the result depends upon the relatively weak action of the intraocular musculature.

*Simple or Noncongestive Glaucoma.* Three cases of simple glaucoma were injected subconjunctivally with adrenalin with slight reduction of tension in two and none in the third. The unfortunate experiences of Hamburger and Hegner of the precipitation of an attack of acute congestive glaucoma were not repeated in this small series; but with that experience in mind, the injections were not repeated. However, in this type of the disease, temporary relief of the hypertension is of but little avail and consequently, reasoning *a priori*, the use of adrenalin is not particularly indicated in simple glaucoma.

*Hypertension that has Recurred After an Operation for Glaucoma.* It happens not infrequently that an iridectomy in congestive, or a cyclodialysis in simple glaucoma, reduces the hypertension temporarily; but within a few weeks or months there is an insidious upward advance of the intraocular pressure without accompanying congestive symptoms. Miotics are of but little avail. In this type of hypertension, the subconjunctival injection of adrenalin renders yeoman service in that there is a resultant fall of tension that is maintained from ten to fourteen days unaided. If miotics of moderate strength be used in addition to the injection, in many cases the intra-

ocular tension can be kept indefinitely within the limits accepted as normal. A striking example was the case of a bilateral chronic congestive glaucoma upon whom bilateral iridectomy had been performed with an intervening interval of about one year. The second eye stayed within the limits of normal tension during the period of observation, some three months. Two months later, or five months after the operation, the patient reappeared complaining of gradual loss of vision in that eye. There were no signs of congestion, but the tension stayed around 45 mm. Hg., despite the energetic use of miotics. Four minims of 1-1000 adrenalin were injected subconjunctivally and the miotics discontinued. Twenty-four hours after the injection, the tension was 15 mm. Hg., but it gradually rose so that seven days later, it stood again at the former figure of 45 mm. Hg. Adrenalin was again injected and 1% pilocarpin nitrat ordered instilled three times daily. Since then, the tension has never risen above 25 mm. Hg. Two similar cases have convinced me of the beneficial effect of the subconjunctival injection of adrenalin after a technically good, but clinically unsuccessful operation for glaucoma. Whether or not this holds true for simple glaucoma as well as for the congestive forms, time alone will tell.

*Hypertension Secondary to Uveitis (Secondary Glaucoma or Iritis Glaucomatosa).* Fortunately less than five per cent of cases of uveitis, either acute or chronic, are complicated by an increase in intraocular tension; for in those cases, the decision as to whether to use a mydriatic or a miotic is extremely difficult to make. And in those very cases, the subconjunctival injection of adrenalin makes life considerably easier for the ophthalmologist, for the majority of cases of hypertension of this type yield to the injection. Seldom is it necessary to use more than one injection during an attack; but if necessary, the procedure may be repeated daily without fear of unpleasant subconjunctival adhesions. In two of my earlier cases, there was no reduction in tension from the injection, but I now believe that had the injection been repeated, the tension would have been reduced as it was in the others. One case may be mentioned

briefly as illustrative of the type. The hypertension made its appearance before the uveitis could be diagnosed (this was before the days of the slit lamp) and vigorous miotic treatment was instituted. Some two or three days later, precipitates appeared on the posterior surface of the cornea and the diagnosis was rendered simple. But the tension remained well over 50 mm. Hg. On the fourth day, four minims of 1-1000 adrenalin were injected subconjunctivally and the miotics discontinued. Twenty-four hours later, the pupil was well dilated as the use of atropin had been started simultaneously with the discontinuance of the miotics, and the tension was slightly subnormal. The eye remained soft until after the disappearance of the uveitis. Not all cases will yield to one injection so that not infrequently a daily repetition of the injections becomes necessary. Nevertheless, the subconjunctival use of adrenalin has become fixed in my mind as an essential in the treatment of hypertension due to uveitis.

#### TECHNIC OF USE.

The injection is so simple that it is carried out in the office without trouble. The eye is thoroly anesthetized with 2% butyn without the addition of adrenalin. In order that the sterility of the adrenalin to be injected is assured, it has been found advisable to use the 1-1000 adrenalin that comes sealed in 1 c.c. ampules. This is drawn into a fine syringe and from three to six minims injected underneath the conjunctiva at any convenient place. As it is usually less annoying for the patients, I inject the preparation under the conjunctiva half way between the lower limbus and the lower cul-de-sac. A moderate amount of dull ache follows the injection for about fifteen minutes, but it is not advisable to endeavor to minimize this by massage of the bleb thru the lid, for the local effect and not the systemic absorption of the drug is desired. In one case, slightly more than eight minims were injected and within three minutes, marked systemic effects appeared in the form of shortness of breath, sharp backache, etc. In fact, the symptoms became so severe that the conjunctiva was incised and the excess of adrenalin washed away by subconjunctival lavage with normal salt solu-

tion. Therefore I believe it advisable not to inject more than six minims, unless previous injection has shown that the patient suffers no systemic effect from larger amounts. It does not seem to make any great difference whether the adrenalin is injected nearer the limbus or more posteriorly under the transitional folds. It is not advisable to combine any anesthetic with the adrenalin in order to minimize the pain.

#### METHOD OF ACTION.

The modus operandi of the subconjunctival injection of adrenalin in reducing hypertension of the eyeball is not definitely known. But I believe that the adrenalin acts as a stimulus to the sympathetic nerve fibers that are the vasomotor control of the eye. (Preglaucomatous Eye, A.J.O., p. 603.) That the sympathetics in the orbit are stimulated by the adrenalin injection is definitely shown by the enormous dilatation of the pupil that follows the injection. In all probability, the intraorbital vasomotor sympathetics that come to the eyeball by way of the ciliary ganglion are likewise stimulated with a resultant contraction of the vessels of the choroid and ciliary body. Such a contraction produces a decrease in the actual intraocular content and lowers the pressure in the vitreous chamber somewhat below that

in the anterior chamber. As a result, the diaphragm of the eye (the lens and iris) is retracted backward and the peripheral portion of the iris pulled back from the angle of the anterior chamber. The excretory angle is thus freed and the normal exchange of intraocular fluids thus restored. An alternative theory of the action of the adrenalin injection is that the drug contracts the vessels of the iris, thus reducing its anteroposterior diameter, and allowing the intraocular fluids access to the angle of the anterior chamber. Both are rather hypotheses than theories, and it is more than likely that both play a role.

It is realized that no method of therapy can be based upon the small number of cases embodied in this report; but the striking results attained in my series, combined with the publication of similar results from abroad, justify the presentation of this addenda to our glaucoma armamentarium. No ophthalmologist in this country sees a sufficient number of cases of glaucoma within the course of a year or so to give the method a trial sufficiently exhaustive to lead to its adoption or rejection, and so it is hoped that a large number of ophthalmologists will try the subconjunctival injection of adrenalin in a large number of cases and prove either its worth or failure.

### A STANDARDIZED TEST OBJECT FOR VISUAL FIELD STUDIES ELECTRIC ILLUMINATION.

JOHN N. EVANS, M. D.

BROOKLYN, N. Y.

A dull porcelain surface reflecting light from a small electric lamp can be mounted in a tube to be used as the test object for perimeter, campimeter, tangent screen or other background. Read before the Brooklyn Ophthalmological Society, Feb. 21, 1924.

To anyone interested in perimetry, the need of standardization of numerous factors becomes apparent. Various organizations feeling this have created committees to suggest practical standards. Any suggestion leading toward practical means of standardizing the test object seems worthy of presentation.

It is proposed to provide a standard object, the intensity and quality of illumination being so controlled that the same conditions can be reproduced at various examinations and under a wide variety of conditions.

During the past two years the following object has proven satisfactory in the hands of the writer, when used in subdued general illumination. The elements consist of:—

1. The wand and conductor.
2. The light source and its intensity controls.
3. The reflector and the filtering lenses and apertures.

The wand (9) consists of a small brass tube  $\frac{1}{4}$  inch, or less, in diameter and 6 to 8 inches long. It is provided at one end with a universal thread (10) to fit

the common types of flashlight battery containers. At the other end is an electric ophthalmoscope lamp (8). An insulated conducting wire passes from the contact to the lamp.

This wand slides inside of a similar tube (7); the external surface is a dull black. At the distal end two holes are provided (3), on opposite aspects, one 2 mm. in diameter, one 4 mm. in diameter. A cartridge like target carrier slips into this distal (5) end. It con-

Disc form object—permits most uniform illumination.

Size of the object is variable.

Colors are pure, permanent (spectroscopically standardized glass filters).

Standardizable illumination under all conditions is reproducible (3 foot candles to 16 foot candles) in quality and intensity.

There are no reflexes and no diffusion of light from the object on the surroundings.

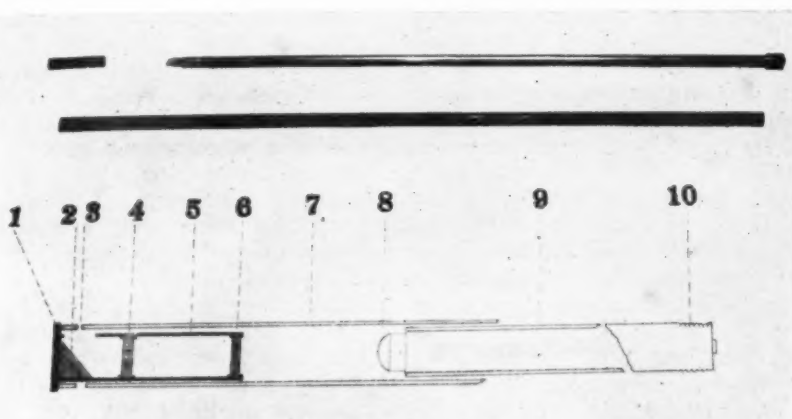


Fig. 1.—Illustration of Test Object for Visual Field Studies. (Evans.)

- 1 and 5. Cartridge.
2. Unglazed porcelain target.
3. 2 mm. aperture.
4. Filter.
6. Daylight filter.

7. Sliding housing.
8. Ophthalmoscope light.
9. Conducting element.
10. Universal screw thread.

tains a cylinder of unglazed porcelain (2) with the face, which is toward the light, beveled at an angle of  $45^\circ$ .

Posterior to the unglazed porcelain, a blue tinted glass disc is inserted to filter out the yellow light and more nearly simulate daylight. Anterior to this another slot is provided to contain red, green or blue filters to project a spectroscopically correct color to the porcelain target.

The cartridge may be rotated in the outer housing, so as to project the light thru one or the other of the previously described apertures. The cartridge is also readily removable, so that the filters may be changed.

Altho it is realized that there are many faults and deficiencies in such an object, the following advantages may be enumerated:—

The carrier may be made small enough in diameter to be invisible in the reduced illumination.

Noiselessness.

Suggestion elements reduced to a minimum. (The light can be turned on and off so as to check the veracity and observation of the patient.)

It permits all motions in all directions so that any form of defect may be outlined.

It is structurally simple and presents a minimum protrusion into the field.

It produces no shadows.

The illumination may be varied in intensity without change in color or quality.

Applicability. To perimeters, tangent screens, campimeters (as Peter's), stereoscopes and stereocampimeters (Lloyd, Haitz, etc.)

## PUPILLARY STUDIES IN GENERAL PARALYSIS

WILLIAM D. ROWLAND, M. D., and JOSEPH J. SKIRBALL, M. D.

BOSTON, MASS.

This is the report of measurements of the pupil in 22 cases. It includes the measurements without any mydriatic or miotic (dynamic). Also it includes measurements of pupil diameters after the instillation of cocain. A month later the same eyes were measured for the diameter of the pupil before and after use of homatropin. The comment points out the significance of the results. From The Department of Mental Diseases, Westborough State Hospital. Presented before The New England Ophthalmological Society, January 15, 1924.

This is a study of the pupils in twenty-two cases of advanced general paralysis of the insane, in which the size, contour, and dynamic (here used to indicate a pupil uninfluenced by either a mydriatic or cycloplegic) reactions were observed; with data on similar observations made subsequent to the instillation of cocain followed by eserine. A second series of observations was made a month later, homatropin being substituted for the cocain. Tabulated data with summaries show the pupillary abnormalities due to the disease and the effect of mydriatics on the sympathetic and third nerve innervation.

The preparations used were cocain, hydrochlorid 4%, homatropin hydrobromid 2%, and eserine sulphat 1% (Merck), and were freshly prepared. A millimeter caliper was used to measure the pupil.

August 3, 1922, the first 14 cases were observed, all ambulatory. The dynamic size, shape, and reactions were noted. Then cocain was instilled and the effect noted in 16 minutes, a second instillation and final observations as to size, contour, were made at an average time of 35 minutes. The fundi were studied and eserine instilled with observations. Tabulated data is shown in the first part of tables, 1 and 2. (Fundus readings in table 3.)

September 7, 1922, the same cases were observed again, noting the dynamic size, shape and reactions, after which homatropin was instilled and readings made after an average of 28 minutes. This was followed by eserine as previously carried out. Shown in the right half of tables 1 and 2.

November 9, 1922, the last 8 cases were studied. These were bed cases, and in the more advanced stages of disease. Dynamic size, contour, and reactions were noted, cocain instilled, fundi

read, and eserine instilled. Data shown in the tables 1 and 2 at bottom. (Fundus readings in table 3.)

December 7, 1922, the last 8 cases were completed, by using homatropin and following it with eserine. Data shown in tables 1 and 2.

We are led to make this study from information gained at monthly visitations to the hospital, where about 1,300 cases are cared for. It has been our custom for some years to make routine ophthalmologic observations on all new admissions. This includes fundus examination when cooperation is possible.

We shall attempt to secure similar data from recent cases of general paralysis. But this is obviously a more difficult task, owing to the fact that early cases are not usually found in mental institutions.

This study was made possible thru the kindness of the superintendent, Dr. Walter E. Lang, who, with his medical and clerical staffs, aided us in every way. To them we beg to offer our sincere gratitude.

### COMMENT.

Table 1, shows irregular and unequal pupils in 13+ % and 31+ % respectively. None of these had synechia to modify these phenomena. A second reading gave different results in a few cases, which is a rather consistent finding in general paralysis. Again, these irregularities and inequalities may change under mydriatics, and differ again when comparing the mydriasis from influence of cocain on the sympathetic and homatropin on the third nerve innervation. On the whole, homatropin gave more marked mydriasis than cocain; which might be an indication that the sympathetic dilators were unable to pull against a normal acting sphincter so well as their

unstimulated tonus was able to widen the pupil when the opposing sphincter was paralyzed. A general observation

was that eserine gave quicker miosis after cocaine than after homatropine, as in normals.

TABLE 1.

Dynamic size in mm. Cocaine Dilatation followed by Eserine Contraction; and Homatropine Dilatation followed by Eserine Contraction.

| No. | Dynamic                                       | Cocaine 4%                                   | Eserine 1%                               | 2nd Dynamic                      | Homatropine 2%                           | Eserine 1%                                        |
|-----|-----------------------------------------------|----------------------------------------------|------------------------------------------|----------------------------------|------------------------------------------|---------------------------------------------------|
| 1   | 4                                             | 25 min. $5\frac{1}{2}$<br>$4\frac{1}{2}$     | .....                                    | 3                                | 29 min. 6 oval, 90<br>$6\frac{1}{2}$     | 42 min. 5<br>$4\frac{1}{2}$                       |
| 2   | 6                                             | 37 min. $6\frac{1}{2}$<br>$5\frac{1}{2}$     | 29 min. 3<br>3                           | 5                                | 29 min. $7\frac{1}{2}$<br>$7\frac{1}{2}$ | 42 min. 4 irreg.<br>$6\frac{1}{2}$ excent.        |
| 3   | 7                                             | 41 min. 9<br>9                               | .....                                    | $6\frac{1}{2}$<br>6              | 29 min. 9<br>9                           | 42 min. $5\frac{1}{2}$<br>4                       |
| 4   | $3\frac{1}{2}$<br>$2\frac{1}{2}$              | 31 min. 4<br>4                               | 31 min. $1\frac{1}{2}$<br>$1\frac{1}{2}$ | $2\frac{1}{2}$<br>$2\frac{1}{2}$ | 29 min. 6<br>29 min. 6                   | 42 min. 5 exc. 12 o'cl.<br>42 min. 5 exc. 1 o'cl. |
| 5   | 4<br>$3\frac{1}{2}$                           | 37 min. $5\frac{1}{2}$<br>$5\frac{1}{2}$     | .....                                    | .....                            | absent from examination                  | .....                                             |
| 6   | 4<br>4                                        | 38 min. 6<br>6                               | 22 min. $1\frac{1}{2}$<br>$1\frac{1}{2}$ | $3\frac{1}{2}$<br>$3\frac{1}{2}$ | 29 min. 6<br>6                           | 24 min. 5<br>4                                    |
| 7   | $3\frac{1}{2}$<br>$3\frac{1}{2}$              | 39 min. $5\frac{1}{2}$<br>$5\frac{1}{2}$     | 20 min. $1\frac{1}{2}$<br>$1\frac{1}{2}$ | $3\frac{1}{2}$<br>$3\frac{1}{2}$ | 29 min. 7<br>7                           | 40 min. 6<br>5                                    |
| 8   | $4\frac{1}{2}$<br>$4\frac{1}{2}$              | 39 min. $7\frac{1}{2}$<br>$7\frac{1}{2}$     | 18 min. 2<br>2                           | 4<br>4                           | 28 min. $7\frac{1}{2}$<br>$7\frac{1}{2}$ | 24 min. 4<br>4                                    |
| 9   | $3\frac{1}{2}$<br>$3\frac{1}{2}$              | 39 min. 6<br>6                               | 16 min. 3<br>4                           | 4<br>4                           | 28 min. 7 ovalx90<br>7 ovalx135          | 40 min. 3<br>$4\frac{1}{2}$                       |
| 10  | $4\frac{1}{2}$<br>3                           | 39 min. 7<br>$6\frac{1}{2}$                  | 15 min. $1\frac{1}{2}$<br>$1\frac{1}{2}$ | .....                            | discharge to home.                       | .....                                             |
| 11  | 4 irreg.<br>$1\frac{1}{2}$                    | 39 min. 7<br>3                               | .....                                    | 4<br>$2\frac{1}{2}$              | 27 min. 6<br>5 ovalx135                  | 25 min. 4<br>2                                    |
| 12  | $4\frac{1}{2}$<br>$4\frac{1}{2}$              | 27 min. 7 ovalx45<br>ovalx135                | 8 min. $5\frac{1}{2}$<br>$5\frac{1}{2}$  | $3\frac{1}{2}$<br>$3\frac{1}{2}$ | 28 min. 6<br>6                           | 24 min. 4<br>$3\frac{1}{2}$                       |
| 13  | $3\frac{1}{2}$<br>$3\frac{1}{2}$              | 42 min. 7 ovalx45<br>$6\frac{1}{2}$ ovalx135 | 7 min. $6\frac{1}{2}$<br>6               | $3\frac{1}{2}$<br>$3\frac{1}{2}$ | 28 min. $7\frac{1}{2}$<br>$7\frac{1}{2}$ | 24 min. $3\frac{1}{2}$<br>$3\frac{1}{2}$          |
| 14  | $6\frac{1}{2}$ irreg.<br>$6\frac{1}{2}$ ov.90 | 31 min. 8<br>8                               | .....                                    | .....                            | in bed, not observed                     | .....                                             |
| 15  | 2 irreg.<br>2 irreg.                          | 57 min. 6<br>3                               | 75 min. $1\frac{1}{2}$<br>$1\frac{1}{2}$ | .....                            | 35 min. 6<br>7                           | 30 min. $1\frac{1}{2}$<br>3                       |
| 16  | 3<br>3                                        | 56 min. 5<br>4                               | 75 min. $1\frac{1}{2}$<br>$1\frac{1}{2}$ | .....                            | 35 min. 5<br>5                           | 30 min. 4<br>4                                    |
| 17  | 3<br>3                                        | 53 min. 5<br>7                               | 75 min. $1\frac{1}{2}$<br>$1\frac{1}{2}$ | .....                            | 35 min. 5<br>5                           | 30 min. 2<br>2                                    |
| 18  | 3<br>3                                        | 56 min. 4<br>5                               | 75 min. 2<br>2                           | .....                            | 35 min. 6<br>8                           | 30 min. $1\frac{1}{2}$<br>2                       |
| 19  | 4<br>4                                        | 54 min. 5<br>5                               | $1\frac{1}{2}$<br>$1\frac{1}{2}$         | .....                            | 35 min. 9 ad max<br>9 ad max             | 30 min. 3<br>4                                    |
| 20  | $1\frac{1}{2}$<br>$1\frac{1}{2}$              | 55 min. 4<br>3                               | 75 min. 1<br>1                           | .....                            | 35 min. 5<br>5                           | 30 min. 1<br>1                                    |
| 21  | 3<br>2                                        | 53 min. 4<br>4                               | 75 min. 1<br>1                           | .....                            | 35 min. 9 ad max<br>9 ad max             | 30 min. 2<br>2                                    |
| 22  | 3<br>3                                        | 52 min. 5<br>6                               | 75 min. 2<br>2                           | .....                            | 35 min. 8<br>8                           | 30 min. 3<br>3                                    |

## SUMMARY.

- A—Irrregular pupils in 3 cases, 13.6%, first reading.  
 B—Unequal pupils in 7 cases, 31.8%, first reading.  
 C—Pupils dilated by cocaine,  $\frac{1}{2}$  to 4 mm., 22 cases, 100%.  
 D—Pupils dilated by cocaine, irregularly, 2 cases, 9%.  
 E—Pupils dilated by cocaine, unequally, 11 cases, 50%.  
 F—Pupils dilated by homatropine,  $2\frac{1}{2}$  to 7mm., 19 cases, 100%.  
 G—Pupils dilated by homatropine, irregularly, 3 cases, 15.8%.  
 H—Pupils dilated by homatropine, unequally, 4 cases, 21%.  
 I—Pupils dilated wider by homatropine than by cocaine, 13 eyes, 59 % (series 1-14).  
 J—Pupils dilated less by homatropine than by cocaine, 3 eyes, 13.6% (series 1-14).  
 K—Pupils dilated equally by homatropine and by cocaine, 6 eyes, 27% (series 1-14).  
 L—Contractions by eserine more rapid after cocaine than after homatropine.

TABLE 2.

Comparison of first and second Dynamic Size, Shape and Reactions.  
Comparison of Cocain and Homatropin Dilatation.

| No. | 1st Dynamic size, shape, reaction     | Cocain    | 2nd size, shape, reactions         | Homatropin   |
|-----|---------------------------------------|-----------|------------------------------------|--------------|
| 1   | 4, ok to light and accommodation      | 5½        | 3, stiff to light, ok to accom.    | 6 oval x 90  |
|     | 4, ok to light and accommodation      | 4½        | 3, stiff to light, ok to accom.    | 6½           |
| 2   | 6, neg. to light and accommodation    | 6½        | 5, ok to light and accom.          | 7½           |
|     | 4, neg. to light and accommodation    | 5½        | 5, ok to light and accom.          | 7½           |
| 3   | 7, neg. to light, slight to accom.    | 9         | 6½, ok to light and accom.         | 9            |
|     | 6, neg. to light, slight to accom.    | 9         | 6, ok to light and accom.          | 9            |
| 4   | 3½, ok to light and accommodation     | 4         | 2½, stiff to light and accom.      | 6            |
|     | 2½, ok to light and accommodation     | 4         | 2½, stiff to light and accom.      | 6            |
| 5   | 4, slight to light and accom.         | 5½        | Absent from examination            |              |
|     | 3½, slight to light and accom.        | 5½        | absent                             |              |
| 6   | 4, slight to light and accom.         | 6         | 3½, slight to light, ok to accom.  | 6            |
|     | 4, ok to light and accommodation      | 6         | 3½, slight to light, ok to accom.  | 6            |
| 7   | 3½, stiff to light, ok to accom.      | 5½        | 3½, stiff to light, ok to accom.   | 7            |
|     | 3½, stiff to light, ok to accom.      | 5½        | 3½, stiff to light, ok to accom.   | 7            |
| 8   | 4½, neg. to light, slight to accom.   | 7½        | 4, neg. to light, slight to ac.    | 7½           |
|     | 4½, slight to light, slight to accom. | 7½        | 4, neg. to light, slight to ac.    | 7½           |
| 9   | 3½, neg. to light, slight to accom.   | 6         | 4, neg. to light, slight to ac.    | 7 oval x 90  |
|     | 3½, neg. to light, slight to accom.   | 6         | 4, neg. to light, slight to ac.    | 7 oval x 135 |
| 10  | 4½, ok to light and accommodation     | 7         | Discharged to home                 |              |
|     | 3, ok to light and accommodation      | 6½        |                                    |              |
| 11  | 4, irreg. ok to light and accom.      | 7         | 4, slight to light, slight to ac.  | 5            |
|     | 1½, neg. to light, ok to accom.       | 3         | 2½, slight to light, slight to ac. | 5 oval x 135 |
| 12  | 4½, neg. to light and accommodation   | 7 oval 45 | 3½, slight to light, ok to accom.  | 6            |
|     | 4½, neg. to light and accommodation   | 7 "x135   | 3½, slight to light, ok to accom.  | 6            |
| 13  | 3½, ok to light and accommodation     | 7 " 4     | 3½, slight to light, and accom.    | 7½           |
|     | 3½, ok to light and accommodation     | 6½ " 135  | 3½, slight to light, and accom.    | 7½           |
| 14  | 6½, irreg. ok to light and accom.     | 8         | In bed, not observed               |              |
|     | 6½, oval 90, ok to light and accom.   | 8         |                                    |              |
| 15  | 2, irreg. neg. to light and accom.    | 6         |                                    |              |
|     | 2, irreg. neg. to light and accom.    | 3         |                                    |              |
| 16  | 3, neg. to lt. sluggish to accom.     | 5         |                                    |              |
|     | 3, neg. to lt. sluggish to accom.     | 4         |                                    |              |
| 17  | 3, neg. to light, ok to accom.        | 5         |                                    |              |
|     | 3, neg. to light, ok to accom.        | 7         |                                    |              |
| 18  | 3, neg. to light, ok to accom.        | 4         |                                    |              |
|     | 3, neg. to light, ok to accom.        | 5         |                                    |              |
| 19  | 4, ? to light, slight to accom.       | 5         |                                    |              |
|     | 4, ? to light, slight to accom.       | 5         |                                    |              |
| 20  | 1½, neg. to light, slight to accom.   | 4         |                                    |              |
|     | 1½, neg. to light, slight to accom.   | 3         |                                    |              |
| 21  | 3, neg. to light, slight to accom.    | 4         |                                    |              |
|     | 2, neg. to light, slight to accom.    | 4         |                                    |              |
| 22  | 3, ? to light, ok to accommodation    | 5         |                                    |              |
|     | 3, ? to light, ok to accommodation    | 6         |                                    |              |

## SUMMARY.

A—Disagreement between 1st and 2nd dynamic reactions, 5 cases, 45%.

B—Argyll Robertson pupils, 20 eyes, 45.4%, all dilated with cocain and homatropin.

C—Pupils normal to light and accommodation (1st reading), 12 eyes, 27.3%.

D—Pupils negative to light and accommodation, 4 eyes, 9%.

Table 2. As in the first table, inconsistencies are noted between first and second dynamic readings. Here reactions differed in 45%. Argyll Robertson pupils were constant in the advanced

bed cases, showing a total of 45.4% of eyes, all dilated with both cocain and homatropin. Normal pupils were found in only 27.3% of eyes.

TABLE 3.

Complementary data—Age, Vision, Media, Fundi, Diagnosis, Duration of disease.

| No. | Age. | Vision          | Media and Fundi                                                                               | Diagnosis                   | Duration     |
|-----|------|-----------------|-----------------------------------------------------------------------------------------------|-----------------------------|--------------|
| 1   | 57   | 20/70<br>20/30  | All vessels overfilled<br>All vessels overfilled                                              | Cerebral Syph.<br>Psychosis | 5 years      |
| 2   | 22   | 12/15<br>12/15  | Cilioretinal arteries, phys. cup, shallow<br>Pseudopapillitis temporal edge-bilateral         | Gen. Paralysis              | 2 years      |
| 3   | 33   | Excited         | No pathology<br>Lamina prominent, venous engorgement                                          | Gen. Paralysis              | 1 year       |
| 4   | 37   | No record       | Large physiologic cup<br>Large physiologic cup, engorged veins                                | Gen. Paralysis              | 4 years      |
| 5   | 65   | 20/70<br>20/50  | Temp. disc pale, lamina prominent, vas. sclerosis<br>Disc indistinct, sclerosed vessels       | Gen. Paralysis              | 4 years      |
| 6   | 45   | 20/30<br>20/30  | No pathology<br>Temp. disc pale, multiple cilioretinal artery.                                | Gen. Paralysis              | 7 years      |
| 7   | 50   | 12/15<br>12/15  | Veins engorged and tortuous<br>Veins engorged and tortuous                                    | Gen. Paralysis              | 3 years      |
| 8   | 32   | 20/30<br>20/30  | Phys. cup, lamina prominent, macula stippled<br>Pale disc, uniformly narrowed vessels         | Gen. Paralysis              | 2 8/12       |
| 9   | 55   | No record       | Large phys. cup, lamina prom. engorged veins<br>Large phys. cup, lamina prom. temp. disc pale | Gen. Paralysis              | 2 10/12      |
| 10  | 39   | 20/20<br>20/20  | Large phys. cup; prom. lamina; engorged and tortuous vessels, bilateral.                      | Gen. Paralysis              | 1 year       |
| 11  | 48   | No record       | Post. staphy., veins engorged and tortuous,<br>Vitreous hazy, no details obtained             | Gen. Paralysis              | 2 years      |
| 12  | 44   | 5/200<br>12/40  | No details obtained, (vitreous hazy)<br>Disc margin blurred (staphyloma ?)                    | Gen. Paralysis              | 1 year       |
| 13  | 39   | 12/15<br>12/15  | Fine stippling thruout, indented veins, sclerosed arteries, bilateral.                        | Gen. Paralysis              | 1 5/12       |
| 14  | 38   | No record       | No pathology<br>No pathology                                                                  | Gen. Paralysis              | 2 years      |
| 15  | 62   | 12/40<br>12/20  | Temp. pallor of disc, senile mac. change, moderate sclerotic vascular changes, bilateral.     | Gen. Paralysis              | 1/12 year    |
| 16  | 84   | No record       | Details not well seen (technical ?)<br>Details not well seen (technical ?)                    | Gen. Arterio-sclerosis      | 5/12 year    |
| 17  | 35   | No record       | No cooperation                                                                                | Gen. Paralysis              | 2 1/2 years  |
| 18  | 59   | No record       | No cooperation                                                                                | Gen. Paralysis              | 5 9/12 years |
| 19  | 32   | 20/30<br>20/30  | No cooperation                                                                                | Gen. Paralysis              | 2 years      |
| 20  | 49   | No record       | Slight temp. pallor of disc; slight vascular sclerosis, bilateral*                            | Gen. Paralysis              | 4 years      |
| 21  | 39   | 10/200<br>20/20 | No cooperation                                                                                | Gen. Paralysis              | 5 years      |
| 22  | 37   | 15/15<br>15/15  | No cooperation                                                                                | Gen. Paralysis              | 2 2/12 years |

\*Died within one year after this observation, 17 cases.

Cerebral Syphilis with Psychosis, 1 case.

General Arteriosclerosis (with Mental Change), 1 case.

General Paralysis, 20 cases.

All cases had positive Wassermann, blood and spinal fluid, and specific treatment.

Table 3, gives additional data. Visual acuity was good enough to not influence pupillary reactions. Fundus pathology shows frequent instances of vascular and disc changes. Final analysis listed two cases not as general paralysis, nos. 1 and 16. Blood and spinal Wassermann tests

as well as gold solution tests were positive in all cases. Specific treatment prolonged the time of ambulation, but the fact that 17 cases were reported as fatal, within one year from the time of our study, would impress one with the aggressiveness of the pathologic processes.

## GLAUCOMA AND THE ENDOCRINS.

PERCY FRIDENBERG, M. D.

NEW YORK CITY.

Many characteristics of glaucoma suggest the importance of the internal secretions in its causation. Our knowledge of the endocrins is reviewed from this point of view. Their relation to the nervous conditions associated with glaucoma is discussed. Endocrin etiology does not imply treatment mainly by gland substance or extracts; but calls for a better understanding of the management of endocrin disorders. Read before the Brooklyn Ophthalmological Society, April 17, 1924. See p. 873.

As the glands of internal secretion represent a basic biologic and pathologic system, any conclusions as to their influence on an eye condition must be prefaced by a study of the endocrin factors, in their relations to the organism as a whole and to developmental, immunologic, physicochemical, and nutritional conditions and ocular processes. This, alone, would take us far afield from the topic directly under discussion, and yet the study is of such practical importance that it cannot be entirely omitted; also the influence of the glands of internal secretions on metabolism, development, immunity by way of the sympathetic or craniosacral (vagus) branches of the autonomic (vegetative) nervous system, on equally important but more restricted functions such as those of the intestinal, the respiratory or the cardiovascular tract. The terms systemic disease, diathesis, condition, and constitutional treatment have all acquired a fuller and a different meaning. We are entering upon an era of a newer humoral pathology, and its applications to ocular conditions is only just beginning to be studied and understood.

When we speak of glaucoma we have in mind a syndrome, which even clinically is by no means uniform; while etiologically there is a decided multiplicity of causative factors, remote and immediate, local and general. Increased intraocular tension is a condition about which we still have a great deal to learn. We can not observe and measure the complicated process, by which in health a delicate balance is maintained between the secretion and the off flow and transscleral filtration of intraocular fluids. We have a fairly accurate conception of the histologic and topographic anatomic conditions of the mechanism underlying this process. But as to the fundamental control, its response to nervous stimuli sensory, oculomotor, vegetative, or vaso-

motor, we are almost completely ignorant; as in fact we are about such an important but relatively small detail as the relation of arterial tension and hypertension, systemic or ocular, to intraocular pressure, itself.

Our clinical observation deals largely with end states; our surgical experience, with mechanical, physical, short cuts. Our knowledge of prepathologic states, to say nothing of underlying conditions, is practically nil. Increased intraocular tension is a pathologic condition expressing an upset in the delicate balance between secretion of fluids in the eye and their transscleral filtration and off flow, at the iris angle, mainly. It is quite possible that there is in health, or under pathologic conditions, possibly in both, or maybe only under special circumstances of one or the other, a secondary, accessory or vicarious drainage system, aside from Schlemm's canal and the filtration angle in the strict sense. Thus, the capillaries and venous trunks of the choroid might account for a large amount of fluid; and the spaces between the optic nerve sheaths, for even more. Even slight alteration in either factor may cause a marked change in the amount of fluid retained within the eye, increasing the intraocular tension, and appearing, clinically, as glaucoma.

The presumably ciliary secretion has its source in a veritable terra incognita. We know very little of the fluctuations of quantity of aqueous secreted under various conditions, or of the alteration of this process under the influence of various states of blood pressure, heart action, or pulse rate. We have everything to learn as to the effect of locally instilled miotics and mydriatics on the secretion rate and possibly the chemical constitution of the intraocular fluids, to say nothing of alkaloids administered by mouth or injected into the blood stream. It is quite possible that reaction to sen-

sory or such nervous stimuli as pain, anger, or the results of hunger, exhaustion, exposure to extreme cold, or fear, or loss of sleep, may, again, have as marked an effect thru their secretory or toxicochemical end products, as drugs themselves. Crile and Cannon have shown definitely that nervous or emotional stimuli are diffuse chemical reactions connected with the sudden production and discharge into the blood stream, and via the same to various organs, of endocrin principles, notably thyroxin and adrenalin.

The other arm of the balance, that concerned with filtration or off flow, depends for its integrity on factors which are largely topographic anatomic, histologic, or mechanical; and of these we have a certain mass of facts, mainly from clinical observation and the results of operations, some from microscopic study, practically none from experimental research. One of the most important of these factors is presented by the dimensions of the lens, and its relation to the circumlental space and the root of the iris. The predisposition to glaucoma of hyperopic eyes with a large lens, small circumlental space, shallow anterior chamber and easily obliterated iris angle, forms the basis of Priestley Smith's well known theory of causation of glaucoma. A more advanced stage of the same topographic discrepancy is offered by the swelling of the lens fibers in the stage of imbibition of cataract, after needling operation, or penetration of the lens capsule by foreign body or instrument. Subluxation of the lens with irregular shallowing, or its dislocation into the anterior chamber with complete blocking of the filtration angle present the pathogenetic climax. Less frequently we note glaucomatous tension as a result of the changes in the posterior segment of the eyeball, such as a tumor growing into the vitreous, complete block of the pupillary filtration path by exudate or total posterior synechia.

Chemic and histologic factors are presented by alterations in the specific gravity, viscosity, or albumin-protein content of the intraocular fluids, or of fluid effusions, hemorrhagic or inflammatory, which may mingle with them. Glau-

comatous tension in cases of so-called spongy iritis with gelatinous exudate, is a case in point. Increase in density of the fibers surrounding Schlemm's canal and other spaces in the filtration area, with consequent contraction of their lumina, has been noted as a cause of high tension following burns with acid, which produced a diffuse sclerosis or cicatrization completely surrounding the area of the corneal limbus.

The forms of glaucoma thus far enumerated do not properly belong to our investigation however interesting clinically, or important from the surgical standpoint. Of the two forms of primary glaucoma, that of glaucoma simplex, or simple chronic glaucoma, presents unusual difficulty. Its relative infrequency, insidious onset, and slowly progressive course; the absence of dramatic objective signs or clinical symptoms, as well as of prompt and definite reaction to treatment or operative procedures; the scarcity of illustrative pathologic histologic specimens, leave us with few data of practical value, or even theoretic speculative significance. A presentation which does not profess to be much more than the statement of a problem with a reference, perhaps, to some clinical and pathologic data which appear significant to the writer, may well limit itself to that form of glaucoma with whose symptoms and treatment we are fairly familiar, however little we may know about the underlying causes or the details of pathogenesis.

Inflammatory glaucoma, either in the first acute attack or in the relapse, presents certain dramatic clinical features with which you are all familiar, and which I shall take up only as they seem to show some definite relation to the endocrin system and its diseases.

*Incidence.* Inflammatory glaucoma is exclusively a disease of later middle age; we may even say, of the climacteric, male or female. Its frequency among the Jews speaks for a racial factor in predisposition. Sex does not appear to play a determining role. But here as well as in regard to race, it is well to bear in mind, that from the biologic standpoint at least, we must go beyond

the acceptance of two definite and basically differentiated sex categories.

There are undoubtedly procentage admixtures of the two sexes, if not in cellular elements, the arrhenoplasm and thelyplasm of Weininger, then most unmistakably and undoubtedly in dominance of endocrin secretions, adrenal, pituitary, and thyroid as well as specifically gonadal. We are justified in speaking of arrhenocrin and thelycrin individuals, whether the total and obvious sex be male or female. It is not at all improbable biologically that not the sex, *per se*, but the sexually heterogeneous endocrin admixture may be the determining, or at least the predisposing factor, in many vital manifestations including disease. The same idea applies to the category of age, to vital epochs, each of which has in addition to characteristic somatic attributes its no less important, if less evident, endocrin preponderance. Infancy and early childhood are, broadly speaking, pituitary. Puberty is thyroid-gonadal. The menstrual period, pregnancy, and lactation show characteristic alterations of balance in the sum total of endocrin secretions.

The menopause offers, of course, the most dramatic picture of endocrin change. The cessation of ovarian function includes a loss of its internal secretion and of its stimulating or inhibiting action on distant organs, and most important of all, on the other endocrin glands. The thyroid as a rule dominates the clinical scene, but if originally deficient or exhausted from repeated and long continued demands, other glands may take the center of the stage and present the picture of hyperpituitarism, hyperadrenalism, or of inverted sexuality, which we may call heterogonadism.

The male climacteric, while less striking, is just as definitely discrinoid. Arteriosclerosis, neurasthenia, rheumatoid arthritis, and in a measure diabetes, come to the fore. Each of these constitutional diseases has a basis, at least in part, in continued and repeated drains on the endocrin glands. Focal infections, repeated colds, fatigue, cold, exhaustion, emotional stress, particularly fear and worry, exhaust the thyroid and

adrenals. The same factors, plus the normal calls of the sexual life, gradually deplete the gonads. Aside from the actual clinical manifestations noted, the prepathologic stage may be expressed more in the sphere of the vegetative nervous system than in that of the glands, with a resulting overaction and hypersensitiveness of the vagus and the sympathetic systems, respectively.

The interpretation of ocular conditions is complicated by the fact that the climacteric is accompanied by certain anatomic-topographic and histologic changes in the eye which, themselves, predispose to increased intraocular tension. Among these we may mention the increased density of the lens nucleus and increase of lens volume from imbibition in immature cataract, increased rigidity of the sclera and quite possibly, altho this is largely conjectural, toughening of the stroma of iris and iris root, with loss of filtration power and of elasticity, resulting in a rigid pupil and in a tendency for the pupil to remain fixed, either in contraction or dilatation, and to be more than usually resistant to specific pupillomotor alkaloids, mydriatics as well as miotics. We know that at the "dangerous age" where we avoid atropin for fear of bringing on an attack of glaucoma, we may have to instill mydriatic drops repeatedly before the pupil dilates at all, and that having dilated, the pupil tends to resist the weaker miotics.

Another complication, and a possible source of error from the endocrinologic interpretation, is presented by a discrepancy between somatic manifestations and clinical symptoms, due to a change in endocrin gland dominance after the formative period. Thus a strikingly hyperthyroid individual may gradually lose his thyroid dominance, and present symptoms of progressive hypothyroidism, or, what is equally significant, a marked predominance of the other gland products.

The acute attack of inflammatory glaucoma has certain marked points of resemblance with a number of other somatic disturbances, which have of late been the object of special study. I have in mind the anaphylaxis reaction, hemoclastic crisis, colloidoclasia, and protein

shock. The similarity or rather analogy extends not only to the clinical symptoms, the mode of onset, the discrepancy between exciting cause and intense reaction, the marked systemic depression; but to the underlying predisposition and etiology, as well. The sudden onset of glaucoma with intense, often agonizing pain deep in the eye and soon extending to cheek, brow, and temple as unbearable "headache," the marked prostration and anxiety, the extension of irritation to other branches of the vagus nerve, notably those of the stomach and intestine, as evidenced by nausea and vomiting, and at times by diarrhea, form a classical and all too familiar picture.

To the endocrinologist this picture is one of vagotonic shock, localizing, or rather originating, in the eye. The disproportion between reaction and exciting cause is another point of resemblance. Slight attention has heretofore been paid to this detail, but I think it is worthy of study. There is certainly something unusual in the condition by virtue of which the pupil may dilate repeatedly, as in the dark room of the examiner, without losing its faculty for brisk contraction, whereas a single drop of a weak mydriatic like cocaine may so upset the balance as to turn the scale from apparent normal to acute glaucoma.

The local ocular symptoms, if not quite contradictory, at least present difficulties of uniform interpretation. We have to deal with manifestation of more than a single proof, and with secondary changes in the eye as a result of the increased tension, or of changes in the size of the pupil and in the disposition of the bulk of the iris stroma. The pupillary state, once the attack has developed, may well appear paradoxical. Certainly the decided dilatation, and still more the stubborn resistance to miotics, would appear to be the very direct opposite to any ocular vagotonia condition.

Incidentally the same paradox, possibly only an apparent one, presents in considering the effects of drugs; as the miotics are all extremely powerful vagotonics, and yet eserine or pilocarpin may cut short the attack and put an end, as sudden and dramatic as was its beginning, to such exquisitely vagotonic mani-

festations as trigeminal pain, nausea, vomiting and hemicraniform headache. The same applies to morphine, coffee and heat which are used, often with excellent effect, as adjuvants, and to the sweating induced by hypodermic administration of pilocarpin. Paradoxes, however, have a way of resolving, when all the aspects are studied, and a double negative is the strongest affirmation. A single misunderstood factor may some day set us right, and establish a logical pathologic connection between the mydriasis of glaucoma and the underlying neurovegetative reaction.

Meanwhile we may be allowed to speculate and to theorize, whether a somewhat rigid and inelastic iris stroma may, under the influence of even a slight but sudden rise in intraocular tension, be responsible for a pressure paresis of the sphincter, which results in a dilated and immobile pupil and one which, as we know, frequently fails to respond to even the concentrated solutions of the stronger miotics, leaving us no alternative but surgical intervention. This may also apply to the apparent paradox of the clinical picture, which we wish to interpret as a vagotonic shock or crisis, and which often yields to the vagotonic drugs enumerated.

Here, too, we may be dealing with secondary manifestations, that is with a complete exhaustion of the vagus system, a temporary vagoparesis due to intense and sudden overstimulation, allowing the sympathetic to dominate. As to the factor causing this intense irritation of the entire vagus system, we have in the foreground of phenomena the agonizing pain caused by increased intraocular tension and the pressure of the semi-fluid contents against the comparatively inelastic walls of the eyeball. Pain, as we know, may also stimulate the sympathetic, and with exhaustion of this vagus system a predominance of the antagonist might also tend by irritation of the dilator fibers of the iris to bring about a dilated pupil or to favor its persistence.

The actual pathologic-chemic nature of the acute attack of glaucoma will have to be restudied in the light of recent advances in physical chemistry and their application to the colloids of the

body. The theory that glaucoma is based essentially on an acute edema of the vitreous is known to you. The acute edemas are, however, exquisitely vagotonic manifestations, as are probably all anaphylactic and protein shock reactions. As examples I may cite Quincke's angioneurotic edema, hives, protein shock such as that seen in serum sickness, vomiting after ingestion of minimal quantities of egg albumin, and the cycle vomiting of acidosis in childhood. It is in a way, almost a homeopathic implication that all these vagotonic manifestations are helped by extremely small doses of vagotonic alkaloids, such as morphin, physostigmin, and pilocarpin.

The effect of these very alkaloids when used, as miotics, in the form of antiglaucoma eyedrops may also be due in part to a selective action in stimulating the exhausted vagus, or what amounts to the same thing, counteracting an irritated sympathetic system, aside from the miosis and any resulting changes in the secretory balance of the eye. The beneficial effect of miosis on increased tension has always been explained, in line with the mechanical theory of Priestley Smith, as due to an unfolding of the iris tissue and its pulling away from the root of the iris and the region of the filtration angle.

The nervous element in glaucoma is interesting and has a number of applications. We have noted its frequency among Jews, a neurotic race, subject to affections of the nervous system and such paraneurotic manifestations as speech defects, neurasthenia, tics, defects of posture and gait, and a host of similar ailments, suspicions, fears and anxieties. We see it most frequently at the time, when in both sexes, the nervous system is beginning to show signs of wear and tear from life's little and big ironies, and when the dying down of gonadal internal secretion has resulted in a relative hyperthyroidism which is always a source of emotional imbalance, neurosis, and cardiovascular erethism.

The sudden onset of an acute attack in an access of rage or fright is well known and links our topic, endocrinologically and etiologically with that equally dramatic syndrome from the opposite

end of the vagus-sympathetic chain, namely exophthalmic goitre, which is so frequently connected causally with extreme emotional demands on the nervous system, either single or repeated. The exact nature of the emotions is still questionable in spite of the research work of Crile, which shows beyond a doubt that they are diffuse, secretogenic reactions to sensory stimuli, whether actual, imagined, or recollected. It is also probable that adrenalin, the pressor substance, is produced under the influence of anger as a defense reaction of nature, while thyroxin is a product of fear and the escape mechanism. Possibly adrenal individuals, choleric and prone to anger, would tend to develop an attack of glaucoma while the hyperthyroidic with morbid tendencies to fear would finally present the picture of Graves' disease.

Solis Cohen of Philadelphia gives us a valuable scheme in discussing the endocrin factors in so-called idiosyncrasies. He distinguishes fundamental, exciting, and determining liability. Applied to the ocular field, and to glaucoma in particular, the first might be represented by an underlying vagotonic or spasmophile makeup, hereditary or acquired; the second, by, say a sleepless night with worry, the chance instillation of a mydriatic; the third, a hyperopic eye, unusually large or swelling lens, a rigid sclera, and the stubborn iris that we reasonably expect at the climacteric.

Neurosis referred originally to cranial nerves or those in the cord. Endocrinology has modified this markedly. The neuroses are engendered by the irregular emotions, and the latter are secretogenic essentially. Many of the somatic or splanchnic neuroses are exquisitely spasmophilic, as asthma, eczema, cyclic vomiting, angina pectoris\* and the protean manifestations of the exudative diathesis, hives. Solis Cohen finds the basis as far as the pathologic mechanism is concerned, in an angioneurotic edema. This is highly significant in its bearing on glaucoma.

\*Routier (Paris Med. 14. v. 1921) reports cases of excessive action of the myocardium cured by resection of the left sympathetic nerve.

The relation of arterial hypertension to glaucoma, or a possible predisposition, is hypothetical so far as actual clinical data and the working out of a basic mechanism, either empirically or experimentally, are concerned. Intraocular tension seems to be independent of blood pressure, or it might be safer to say that the latter is only one of a number of factors. Barker calls attention to the importance of constitutional and environmental factors and the fact that high blood pressure is often met with in several members of the same family, all of whom exhibit more or less characteristic physical and mental traits. Thus such persons often present the so-called apoplectic habit, stocky build, short neck, plethora, obesity; and on the mental side, marks almost as distinctive, worrying tendency, irritability, overseriousness, inability to play, circumscription of interests, ill-balanced life.

Families in which migraine is common or goitre prevalent, seem particularly prone. This observation is especially significant in view of the analogies between migraine as an intermittent claudication of the retina, or of cortical areas associated with vision, and the attacks of limping due to obliterating thrombo-angitis in the lower limbs, on a basis of long continued hypertension in individuals (Russian Jew tailors given to much tea drinking and cigarette smoking) who show the same constitutional inferiority, vasopathic, neuropathic, and endocrinopathic, as those prone to glaucoma. Among the environmental influences acting directly or thru the medium of arteriosclerosis and chronic renal diseases, Barker notes infectious processes and septic foci, chronic intoxications of exogenous or endogenous origin, metabolic disturbances such as diabetes, gout and obesity, and faults in mental or physical hygiene (excitement, worry, anxiety, overwork, indolence, injudicious clothing, exposure, sexual excess).

In the acute glaucomatous attack, all our measures, short of operation, are medicinal and aim to bring about a contraction of the pupil and to relieve pain. Peculiarly enough, all the means are vagotonics, as pilocarpin and eserin, the

former particularly effective when it is given by hypodermic to the point of causing free sweating and marked systemic symptoms, rest in bed, made almost imperative, by the marked pain and prostration, hot applications to the eye, strong coffee, and morphin by hypodermics. The use of pituitrin suggested itself to me as an adjuvant to the miotics on account of its well known action on unstriated muscle fibers, and by its use in paralytic atony of other sphincters, with conditions quite like that of the pupil in glaucoma. Bell in 1909 called attention to the value of pituitary extract in restoring peristalsis to the paralytically distended bowel. Its use as an oxytocic, depending on stimulation of the smooth muscle fibers of the uterus, is well known. The heart muscle, too, is contracted by pituitrin so that we have in the latter extract an adjuvant to morphin and eserin which may prove to be of value.

Adrenalin, when injected into blood-vessels in doses too small to cause a rise of blood pressure, acts upon the smooth muscles of the gastrointestinal tract, inhibiting peristalsis and stimulating contraction of the sphincters. It is supposed to be the endocrinologic antidote of atropin and yet we know, that under certain conditions of ocular tension, adrenalin will dilate the pupil. The action seems to depend in part on the condition of the sympathetic system, and particularly of the superior sympathetic ganglion and its control of the dilatator pupillae. Meltzer Auer noted that after resection of this ganglion for glaucoma, Jonnesco's operation, instillation of the usual weak solutions of adrenalin was followed by maximal mydriasis. Like pituitrin, it raises the blood pressure and is the stimulus, par excellence, of the sympathetic system.

It is rather suggestive that many affections, setting in as acute attacks with pain, are attended by increased intraocular tension. Of these we may mention herpes of the cornea and urticaria. On the other hand there are a number of conditions in which anesthesia of the cornea is a marked symptom; and in these, lowered tension is generally found. Such are keratomalacia, the corneal

xerosis of experimental avitaminosis and neuroparalytic keratitis. Bringing these clinical observations into line with the classical picture of cervical sympathetic paralysis, and the well known triad of enophthalmos, miosis, and hypotony, we may view glaucomatous tension as a vagotonic manifestation of irritation, or better as an end result of that disturbance.

Assuming that vagotonia is the most frequent basis of plus tension in glaucoma, we must carefully study the intracocular effect of chemical principles which are known to act well in systemic disorders due to the same factor in its protean manifestations. Finally, we must consider the possibility of even using sympatheticonics such as belladonna and its derivatives, altho here it must be recognized that we are treading on dangerous ground. Atropin is rightly feared in any conditions with increased intraocular tension. The experienced ophthalmic surgeon does not even allow atropin to be added to the morphin hypodermic which is to be administered to his glaucoma patient.

Still it is an open question, and one which may be settled by animal experimentation, whether belladonna derivatives may not be found of value, if only in prepathologic states associated with marked vagotonia. Given in small doses in the form of the extract, by mouth, and well short of the point of producing any mydriatic action on the pupil, the effect may well be quite the opposite, so far as intraocular tension is concerned, of a mydriatic instillation.

I have elsewhere ventured to suggest the possibility that the eye itself may be an endocrin organ, with an internal secretion (aqueous) as well as an external product of the lacrimal glands. An organ which is strikingly under dual, possibly alternate, control of the vagus and sympathetic. Both secretions are strikingly influenced by emotional states, which are attended by the entrance into the circulation of adrenalin or thyroxin. The large amount of pigment in the intraocular tissues, again, suggests some relation to the chromaffin system; and finally we must bear in mind the large area of secretory epithelium in the coats

of the eyes. There is a certain ill defined analogy in physiologic as well as pathologic reactions, between the salivary glands and the lacrimal glands. Atropin acts similarly on both, in drying up the secretion. In corneal xerosis and keratomalacia there is almost complete cessation of tear secretion. What of the salivary glands in these affections? Pilocarpin is well known as a sialogog. Has it any similar action on the lacrimal secretion?

Much careful study and experimentation must be carried out before we can make practical application of the measures whose principles have been suggested. Further data are required on the relation of intraocular tension to the  $\text{CO}_2$  content of the blood, to blood pressure, to menstruation, pregnancy, and the menopause, and to the various clinical manifestations of dyscrinism. Data are greatly needed on the local effect of miotics, mydriatics and other vagotonic or sympathetico-tonic alkaloids, when given internally; and vice versa, the possible systemic effect of these principles when instilled as eye drops. There is a fruitful field for research in the pupilomotor action, if any, and under various conditions, of the essential endocrin extracts or principles, particularly adrenalin, pituitrin, thyroxin, and corpus luteum extract.

In conclusion, it is well to bear in mind that any therapeutic applications must be preceded by careful determination of the endocrin balance, as far as this is in our clinical powers. Determination of basal metabolism, the Goetsch test, and others, in fact a complete endocrinologic examination may be found to be as important, etiologically, as the Wassermann reaction or urinalysis. This is an essential preliminary to any hormone therapy, or drug treatment directed to the endocrin glands or the vegetative nervous system.

Even in the absence of any marked discrinoid stigmata, i.e. in the prepathologic stage, there may well be elements of danger in the patient's heredity, environment or mode of life. A normal individual may, as a result of repeated infections or by absorption from septic foci, become hyperthyroidic; and if the

toxins repeatedly stimulate the thyroid to over activity there may be a final exhaustion of the gland, and a change of endocrin balance to hypothyroidism. Accordingly, our hygienic and preventive measures in medicine will bear in mind the importance of a normal endocrin make up, and the advisability of eliminating, as far as possible, any factors which admittedly destroy the balance of the hormones.

There seems to be an endocrin implication, and one which is by no means merely theoretic, in the seasonal incidence of disease; in the beneficial effect of sunshine and fresh air in vitamin deficiencies such as rickets; in diet and vegetable principles, notably fruit juices, oranges, tomato, lettuce, and so on, in scurvy, Barlow's disease and other hemorrhagic diatheses due to avitaminosis; cod liver oil, again in rickets, and the vitamin or dietary treatment of beriberi and pellagra. In all of these aspects there may be something of value for the ophthalmologist, and eventually for our knowledge of the nature and treatment of glaucoma, and its relation to the endocrins.

Endocrin therapy does not mean only, or even mainly, the administration of gland extracts or principles, either substitutive in hypocrinisms, or of the antagonists in hypercrinisms. It includes in its wider sense the application of therapeutic principles and of definite medicinal substances at each phase of a pathologic process, from gland to vegetative nerve and thence to end organ. It also takes into consideration the basic states such as excess acid or alkali, calcium or phosphorus, recognizing that these are generally associated causally with dyscrinisms and result in vegetative nerve disturbances, manifesting themselves clinically as vagotonia with spasmophilia, and as sympathicotonia, respectively.

The foundation of a basic metabolic therapy, to influence a possible dyscrasia underlying glaucoma, has not as yet been laid. On the hypothesis of Fischer, that we have to deal, finally at least, with an edema of the vitreous, and that all edemas develop on a basis of some form of

acidosis or other, we may be justified in using the subconjunctival injections of sodium citrate, which the author just mentioned lauds as a capable method by which we can at any time rapidly reduce the abnormal tension of an eye in the state of glaucoma. Pischel's results in several cases did not confirm this dictum, while he states that the pain from the injection was always very severe. Possibly the administration of sodium carbonate by mouth, or in the form of an alkaline Murphy drip may give better results without the pain and possible danger attending local use. Leeches applied to the temple and dionin instilled into the conjunctival sac, have been used with good effect in relieving pain and tension. It is a fair inference that these measures tend to the absorption, or at least the derivation of an edema of the vitreous.

As in other forms of colloidoclasia or protein shock, sodium carbonate may be of value. It is administered intravenously in an 80 per cent solution, cms. 1.5-2 being injected.

In conclusion and summing up we may say that our application of endocrinology to glaucoma will be largely diagnostic and etiologic with some reflections in pharmacology and pathologic anatomy. As to therapeutic possibilities we may well be rather guarded in promises and prospects. In dealing with manifest tendencies or idiosyncrasies on the basis of hormone or gland treatment we are still on safe ground. In the management of a frankly developed glaucoma, all that is changed. We must for the rest continue to rely almost entirely on operative procedures. In those cases in which high tension persists in spite of surgical measures, or relapses occur, or where operation is refused, endocrin treatment will come into its own as also, quite logically, in patients where a simpler operation, as iridectomy has been performed, tension has been lowered, and we hope to do something, in addition, to preserve what we have gained. Of an effective antiglaucomatous hormone therapy we must unfortunately say, *mellonta tauta*, for these things are still largely in the future.

# NOTES, CASES, INSTRUMENTS

## INSTRUMENT FOR REMOVAL OF DEBRIS IN CATARACT EXTRACTION.

J. K. M. PERRINE, M. D.

SAN FRANCISCO, CALIFORNIA.

I present a new instrument for the removal of debris following delivery of the crystalline lens in cataract extraction. It can also be used to great advantage in the operation for after cataract. Every surgeon who has had much experience with the cataract operation, dreads more or less the chances of trouble with fragments of capsule and small debris in general. The following is a description of the instrument accompanied by a drawing.

A cylinder or tube the size of the handle of a Graefe cataract knife is fitted at either end with a threaded shoulder. A rod is fitted with a thread corresponding with the threads cut in the two shoulders. In the end of the rod is fastened a fine broche and by screwing the rod into the cylinder the broche is exposed. The instrument is now open. By screwing the rod back the instrument is closed, the broche being drawn back into the cylinder.

The instrument is introduced into the anterior chamber closed, then, by a full turn, the broche will be presented, and by twisting the instrument in one direction the capsule and debris are picked up and wrapped around the broche. It may now be drawn back into the tube by turning the screw head in the opposite direction which makes the withdrawal of the instrument perfectly safe.

The instrument has fulfilled my expectations in several cases.

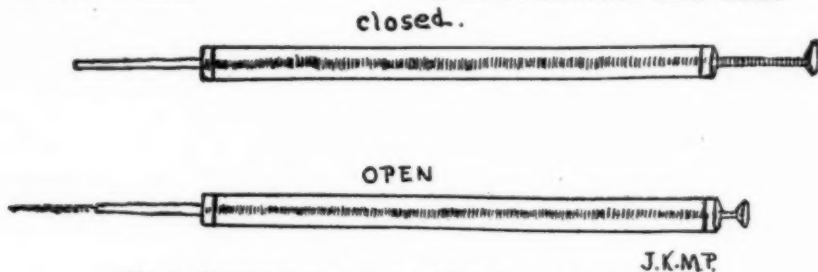


Fig. 1.—Instrument for removing debris in cataract extraction.

## COMMUNICATING VESSEL BETWEEN RETINA AND CHOROID.

J. E. JENNINGS, M. D.

ST. LOUIS.

In the July, 1920 number of the JOURNAL, Dr. Marcus Feingold reported four cases of peripheral communicating vessels between retina and choroid. I wish

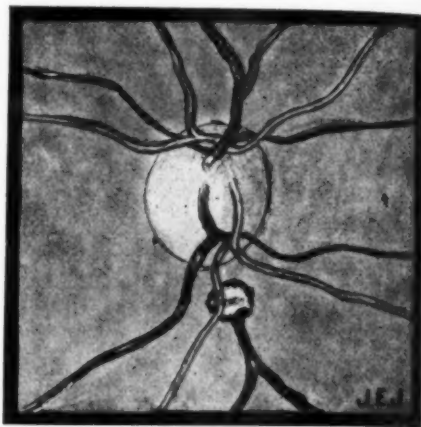


Fig. 1.—Communicating vessels between retina and choroid.

to report a case of this rare condition seen March 22, 1924.

Mr. D. T. Mulatto, aged 34, a fireman, was sent to me to have a test made of his vision and color sense. His vision was normal but he was found to be color blind. In the fundus of the right eye, a short distance below the optic disc, I discovered a small hole in the retina. The rim of the hole was edged with dense black pigment. Into this hole a large vein draining the lower nasal portion of the fundus entered and suddenly disappeared. If this vein had continued on its usual course, it probably would have linked up with the nasal vein, which is much narrower than usual.

## LABORATORY TECHNIC, FOR DETECTING EOSINOPHILES.

EMORY HILL, M. D.

RICHMOND, VIRGINIA

The symptoms of spring catarrh are observed fairly often with little or no departure from the normal appearance of the conjunctiva; that is, patients complain of itching in hot weather, often during the hay fever season: In such cases the diagnosis is important. Eosinophiles can usually be found in the secretion. There may be no visible secretion, and a smear will show nothing but an occasional epithelial cell.

Several times I have failed to find eosinophiles; but after putting a drop of dionin in the eye and waiting a few minutes for the reaction which follows, I have found the tears containing an abundance of these cells. One drop of 1 per cent dionin solution, preceded by a drop of 2 per cent holocain to limit the smarting produced by the dionin, is sufficient. In this way one gets information to justify the statement that the patient has a harmless but intractable condition which cannot be cured, but can be alleviated by treatment. The laboratory diagnosis thus becomes a matter of some importance.

## SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly scientific papers and discussions, include date of the meeting and should be signed by the Reporter or Secretary. Complete papers should not be included in such reports; but should be promptly sent to the Editor as read before the Society.

### COLLEGE OF PHYSICIANS OF PHILADELPHIA

#### Section on Ophthalmology.

March 19, 1924.

T. B. HOLLOWAY, M. D., Chairman.

#### Exhibition of Special Protective Goggles.

DR. MCCLUNEY RADCLIFFE exhibited a pair of protective goggles in which the patient's correcting lenses were mounted in separate cells back of the unbreakable lenses of the goggles. The correcting lenses are held in place by a small projection on the temporal side of the cells fitting into a slot in the goggle frames, and fastened down by the side protectors or blinders. The lenses are marked with R. and L. at the upper temporal margins, which insures the proper insertion in the frames. The frames are set rather low and angular, which prevents the foreign bodies from flying under the frames and nicking the lenses.

One patient, an electric welder, had been using the goggles with his correction, (R.E.—sph.+0.75 comb. cyl.+1.50 ax. 105 deg.; L.E.—sph.+1.25 comb. cyl.+1 ax. 90 deg.), for two months with entire satisfaction. There were no nicks or specks on the correcting lenses.

*Discussion:* DR. HOWARD F. HANSELL suggested as a substitution for the shields of crown glass the harder tho more brittle crystal glass.

DR. G. S. CRAMPTON stated, in this connection, that a test of the eyegrounds, fields and blind spots of fifteen electric welders using the iron arc on street railway intersections, resulted in negative findings, altho some of the men examined had been at the work a number of years. These men used variously colored protective glasses. Usually two colored glasses, such as red and blue, were combined with a clear front glass to catch the metallic splash, the latter glass being frequently renewed. The men admitted occasional accidental exposure to the unshielded iron arc, from which they felt no bad effects unless the action was prolonged, when they experienced the usual delayed effects of an ultra-violet burn.

#### Unusual Case of Congenital Cataract.

DR. LEIGHTON F. APPLEMAN showed a case of congenital cataract over which, upon dilating the pupil, a leash of fine blood vessels could be seen. These vessels were thought to be remains of the tunica vasculosa of the undeveloped lens. Detailed study of the case had not been

made, as it was seen for the first time but a few hours previously.

#### Accommodation in Myopia.

DR. HOWARD F. HANSELL read the paper published in full in this volume, p. 606.

*Discussion:* DR. WM. ZENTMAYER stated, that at the time he entered ophthalmology, the full correction of myopia was being advocated, and he adopted it and has continued it, so that he has had no experience as to the relative value of the two methods in controlling the progress of the myopia. When patients with myopia are seen early in life, they will be comfortable with full correction, no matter how high the degree. It would seem that the disturbed relation between accommodation and convergence produced by a partial correction, would be more likely to cause discomfort.

As to a myopic eye above a certain degree having no accommodative power, Dr. Zentmayer said that over thirty years ago Dr. James Wallace published a paper showing that myopic persons, even of a high degree, often have, when corrected, a near point closer than the average for their age. He did not, as Dr. Zentmayer recalled, give an explanation which involved the consideration of the ciliary muscle. Occasionally, those with high myopia with extensive choroidal atrophy are uncomfortable with full correction, the images being too sharp and distinct. These are at once made comfortable by partial correction, and assisted by the instillation into the eyes of a weak pilocarpin solution.

DR. G. S. CRAMPTON referred to a case of high myopia in a man, aged 30 years, whose correction of  $-20.00$  spherical with a  $-1.25$  cylinder, gave him full vision and comfort in both distant and near use.

DR. E. B. MILLER believed that each case must be studied on its own merit. He referred to a young woman whom he had first examined for glasses ten years ago. She was wearing sph.  $-21$ , in each eye, with a cylinder correction, and read 20/40. His refraction was O.D. sph.  $-21$ , cyl.  $-3$ , ax.  $60^\circ$  and O.S. sph.  $-21$ , cyl.  $-2.75$ , ax.  $120^\circ$ ; which gave her 20/30 vision in each eye, and 75 D.T. for near. With these she had comfortable

vision. Later she was refracted on two occasions by others, who felt that the strength of the lenses should be reduced to give her better near vision. A few days ago she again reported, and said that her glasses were not comfortable. Vision was 20/70 and 20/200. With O.D., sph.  $-22$ , cyl.  $-3$ , ax.  $55^\circ$  and O.S. sph.  $-23$ , cyl.  $-1.25$ , ax.  $130^\circ$ , vision was 20/40 in each eye, and 75 D.T. for near. These glasses were comfortable and are used for both near and distance. In addition to a sister, who had a similar experience, he has seen a number of other cases of high myopia who wear the same high refraction for near and distance with comfort.

#### Industrial Compensation for Eye Injuries.

DR. WILLIAM M. SWEET gave a presentation of the Workmen's Compensation Law of Pennsylvania with reference to injuries of the eye; and read the paper published in full p. 876.

*Discussion:* DR. GEORGE H. CROSS said that Dr. Sweet's resumé of the compensation value of an aphakic eye is so complete, that it leaves little for one to discuss. It does seem rather unfortunate that an injured person should receive no compensation other than for time and medical service while under treatment for the loss of the crystalline lens. Under the all or none provision of the present law, it seems to have been the general tendency of referees to favor the injured party. Many are of the opinion that if there were a graded schedule of compensation, adjusted on the basis of the percentage loss of vision, it would be far more equitable.

He cited an unusual finding that was made in a case in which he was interested. A bricklayer fell about 15 feet receiving a fractured skull. Following his recovery there remained a complete paralysis of one of the ocular muscles, which later improved greatly, so that in the erect posture the vision straight ahead, was 20/20. His occupation, however, necessitated looking down, and in doing so he had a marked diplopia. As a result of this he was awarded damages for the total loss of the eye.

At the present time a Commission on Compensation law, appointed by the

President of the Medical Society of the State of Pennsylvania, is endeavoring to obtain expressions of opinion from medical men thruout the State, in order that there may be presented to the next legislature a modification of the present compensation laws which will more adequately protect the surgeon or medical man in charge of the case. Those of us having definite views on this important subject should forward them to the above commission, of which Dr. M. A. Slocum of Pittsburgh, is Secretary.

DR. H. MAXWELL LANGDON remarked that, as Dr. Sweet says, it did not seem fair to compel an employer to pay for the complete loss of an eye which has suffered the loss of the lens only. It is potentially a very useful eye, and as he has brought out in his paper, where this is done and the eye is used with a correcting lens and again suffers injury with the result that enucleation is necessary, the man might easily be paid twice for the loss of the same eye. According to the Pennsylvania law the referees have no choice but to award compensation for the complete loss of an eye or give him nothing, as there is no gradation in the scale. If the law in this State were like that of New Jersey it would be possible to award compensation on the basis of a partial loss of the usefulness of an eye, and much of the present controversy would be abolished, as the referees naturally feel that the man is entitled to some award, and therefore do their best under the circumstances.

DR. T. B. HOLLOWAY thought there were certain phases that should be corrected by the medical profession in the State before asking the State to put its own house in order. What particular method should be adopted for estimating the extent of the injury, and the amount of compensation that should be awarded? A number of different plans were referred to that have been advocated in recent years, certain of them being quite complicated.

DR. MARY BUCHANAN said the cases cited by Dr. Sweet were those in which the lens was involved. What compensation would be awarded the patient with a cornea burned by lye in which central vision was almost lost?

### Siderosis Bulbi with Dilated Inactive Pupil.

DR. WM. M. SWEET exhibited a young man, 23 years of age, who received a penetrating wound of the left eye on June 28, 1923, with lodgment of a small piece of steel in the vitreous chamber. Six months later there was brownish discoloration of the iris, pupil 6.5 mm. and unresponsive to light or in accommodation, degeneration of the anterior portion of the choroid below, diffuse haze of the vitreous, and vision 20/40. An X-ray localization showed a fragment of steel, 3x1 mm. situated in the lower portion of the vitreous chamber near the vertical plane, and close to the ciliary body. In February last the steel was removed thru a narrow opening in the sclera in the lower outer portion, which was then closed with conjunctiva. Six weeks later the eye was quiet, the pupil reacted 1.5 mm. to direct light, the discoloration of the iris was slowly disappearing, and vision with a lens was 20/20 partly.

Dr. Sweet referred to an identical case reported in a paper by Dr. Nelson M. Black of Milwaukee, at the last meeting of the American Ophthalmological Society. In this case there was return of the contractile power of the iris and lessening of the iris discoloration after removal of the steel. In the paper of Dr. Black were given the various theories for the siderosis and the inaction of the pupil, and in addition, a photographic section of an iris showing the iron pigmentation in a case of siderosis studied by Dr. Verhoeff. In Dr. Verhoeff's opinion impaired motility of the iris is not due to selective action on nerve terminals, but to impairment in function of the muscles of the iris resulting from their affinity for iron.

In answer to a question by DR. TURNER as to the reason for the steel not having been covered with exudation after remaining in the eye for so long a time, DR. SWEET said it is often possible for the operator, from a study of the situation of the entrance wound and the location of the steel as shown by the X-rays to judge whether the metal will be secured with the magnet. Many small fragments pass thru the anterior section

of the globe and drop to the bottom of the vitreous, and in this situation will remain for a long period without becoming imbedded in the tissues. These pieces offer no difficulty in extraction even after remaining in the eye for months or years, whereas a metal particle that passes from entrance wound to become caught in the retina or choroid at the posterior portion of the vitreous chamber may be so firmly bound up in fibrous exudate inside of a week as to prevent extraction by even the strongest magnet.

**Pulsating Exophthalmos.**

DR. WM. ZENTMAYER reported a case of a woman, aged 40 years, who was seen at the Wills Hospital for the first time, January 28, 1924. Vision O.D., 4/60 corrected to 6/30; O.S., 6/60, corrected to 6/9. She was in an automobile accident in July, 1923, and sustained a fracture of the base of the skull. Both eyes, but most markedly the left, became prominent at that time. The protrusion was, in the beginning, greater while lying down. Patient complained of a noise in the left ear with each heart beat. Four years ago had facial palsy. Right eye was turned in in childhood. Now, left eye a relative exophthalmos of 5 mm. measured with a Hertel exophthalmometer. Marked dilatation of the conjunctival vessels and of the orbital veins. Pulsation of the globe can at times be made out. There was decided limitation of the outward excursion and slight limitation in other directions. There was a narrow linear opacity in the lower outer quadrant of the cornea.

Ophthalmoscope: left eye, all about the disc intense striation of the retina, probably due to the persistence of medullary fibers; retinal veins greatly dilated and extremely tortuous, especially the superior; arteries normal. Right eye, a narrow girdle of opaque nerve fibers encircling all but the temporal third of the disc, of pretty even width thruout, but at the upper portion especially there are numerous feathery prolongations beyond the more opaque zone.

There has been nothing added to the symptomatology of this condition since the interesting monograph by de Schweinitz and Holloway, which contains an analysis of most of the cases in

literature not previously tabulated at the time of their publication in 1907. Several authors have from time to time brought the tabulation up to date—Bedell, Zentmayer and Whitham.

The conclusions of de Schweinitz and Holloway concerning the treatment of the affection have not apparently gained acceptance. They were of the opinion that ligation of the superior orbital vein should be first done. The method of choice seems to be ligation of the common or internal carotid artery. The danger to the brain appears to have been overcome by so-called slow ligation. The ligation of the orbital veins also is not without danger, as fatal results and secondary hemorrhage have occurred at least once each.

*Discussion.* DR. C. E. G. SHANNON gave the history of a case he had examined at the request of Dr. Thomas A. Shallow. The man had been admitted to the Jefferson Hospital in January, 1924, with history of an automobile accident four months previously, which caused severe contusions of the head and body but not unconsciousness. Immediately following the accident he noticed a whirring or blowing on the right side of the head coincident with the systolic beat of the heart. Three months after the accident, a swelling was observed in the region of the right orbit which increased gradually until at the time of his admission to the hospital, all the symptoms of a typical traumatic pulsating exophthalmos were noted—upper lid swollen; lower tarsal conjunctiva markedly chemotic; eyeball proptosed about 10 mm. and immobile; cornea clear but anesthetic. Ophthalmoscope: media clear, disc swollen and engorged, entire retina hazy, two small areas of inflammatory edema in the macula region, and veins extremely dilated and tortuous, especially the superior and inferior temporal. Vision reduced to counting fingers at two feet. Palpation over the right eyeball revealed pulsation and a thrill, and auscultation a distinct bruit.

Dr. Shallow ligated the common carotid one inch below the point of bifurcation, two days after the man entered the hospital. On the following day there was complete absence of pulsation and

bruit, and the patient stated the noise on the right side of the head had ceased. The swelling of the lids and the proptosis gradually receded, and three months following the operation, the exophthalmometer reveals recession of the proptosis from 10 to 5 mm. and the swelling of the lids reduced to almost normal. The patient has been comfortable since the operation.

DR. T. B. HOLLOWAY stated that what was said about the orbital operation was correct at the time it was written. He pointed out that ligation of the common carotid was not free from cerebral complications and that the statistics of Siegrist give an incidence of about 8 per cent. Still further, in a few instances, ocular complications have arisen. It is true that these statistics run back for years and that local conditions such as infection and secondary hemorrhage are now less frequently encountered. On the other hand, he questioned whether the observations concerning cerebral complications were as accurately recorded as those following ligation of the orbital vein.

Dr. Holloway stated that he could only repeat a previous statement to the effect, that if he should develop a pulsating exophthalmos he would probably prefer a slow ligation of the common carotid, but certainly a ligation of the orbital vein before a ligation of the other carotid. After all was said, a number of factors should determine the character of the treatment, such as the age of the patient, the extent and character of the injury, the associated medical conditions, and the local signs.

DR. ZENTMAYER said that he thought Dr. Holloway touched on the important point in the management of these cases when he said that it depended somewhat on the degree of exophthalmos and the general condition of the patient. The case which he had just shown was not greatly annoyed by the bruit, the exophthalmos is not extreme, and there is neither disfiguring chemosis nor redness of the conjunctiva, so that he had not strongly urged a radical procedure and the patient did not feel that she would care to submit to an operation which might prove serious.

### Mikulicz's Disease.

DR. JOHN P. O'BRIEN exhibited a case of Mikulicz's disease in a colored woman, aged 24 years. Examination revealed enlarged lacrimal and parotid glands; otherwise the physical examination was negative. History shows no T. B.; no miscarriages; Von Pirquet slightly positive; Wassermann negative; urinalysis trace of albumin; leucocytosis 12,000; differential normal; red cells 3,320,000; hemoglobin 65 per cent; fundus negative. Treatment, tonics and hygienic.

*Discussion.* DR. S. LEWIS ZIEGLER stated that he had personally observed five cases of Mikulicz's disease and had reported three cases. The characteristic sign of "blood-hound facies," to which he had called attention, was absent in this case, as the lacrimal glands alone were decidedly enlarged, but the parotids were only slightly more prominent than usual. The other glands were negative.

He thought it was always necessary to search for respiratory obstruction, and to treat it if indicated so as to relieve the suboxidation which caused the glandular hypertrophy. He had found such lesions in all his cases, and had relieved two by tonsillectomy and one by nasal cauterization. The other two were referred to the rhinologist for similar treatment, but he did not know the final result. He thought a similar examination in this case might reveal some obstruction to breathing that might prove to be a causative factor.

C. E. G. SHANNON, Clerk.

### THE BROOKLYN OPHTHALMOLOGICAL SOCIETY.

APRIL 19, 1924.

#### **Glaucoma and the Endocrins.**

DR. PERCY FRIDENBERG, of New York City, read the paper elsewhere published in full in this issue, page 860.

*Discussion.* DR. F. BAILEY. I was in hopes Dr. Fridenberg would give us some of the results of treatment in connection with the endocrins.

DR. DEELEY.—Prof. Imre found by the tonometer a reduction in tension in pregnancy. I would like to ask if that is

due to excitement of the thyroid. In a General Hospital with obstetric service I found in fifteen cases the tension ranged from 9 to 18.

DR. STEINBUGLER How can we explain reduction of tension by atropin in cyclitis?

DR. FRIDENBERG In addition to the late infections one danger of the Elliot operation is that of traumatism to an eye so delicately covered. I did not touch on simple chronic glaucoma; as some claim it is of different origin from the inflammatory, being, perhaps, a form of optic nerve atrophy. I would rather not deal with the treatment for it is still too much in the experimental stage. Our experiments according to Prof. Imre's suggestions were not satisfactory.

Thyroid activity is on the side of sympathetic irritation and high tension. The pituitary is involved in pregnancy. Sympathetic paralysis means contraction of pupil and low tension. Sympathetic irritation means dilatation and plus tension. Herpes zoster gives plus tension, while degenerative conditions with anesthesia gave minus tension. Sometimes pilocarpin instilled in the eye does not lower the tension, whereas given by hypodermic it causes sweating and lowering of tension. Perhaps in ocular medication it may be absorbed and affect the endocrin balance. Glaucoma comes on at a time when the pupil is normally small and more frequently in hyperopia, yet produces a dilatation of the pupil which will not contract. Why? We do not know.

W. M. GARDNER, M. D.  
Secretary.

## COLORADO OPHTHALMOLOGICAL SOCIETY

APRIL 19, 1924.

DR. W. A. SEDWICK, Presiding.

### Gun Shot Inquiry.

F. R. SPENCER and C. L. LA RUE, Boulder, presented a youth whose right eye had been injured with shot from a shot gun. Radiograms showed that one shot had passed entirely thru the eyeball, and was lodged at or near the apex of the right orbit, probably just above

the optic nerve. There were a number of heavy floaters in the vitreous. The vision of the injured eye was 1/60.

### Coloboma of Iris and Choroid.

JAMES M. SHIELDS, Denver, presented a boy aged eleven years who had bilateral coloboma of the iris associated with coloboma of the choroid. The patient was one of eight children. No other member of the family had any ocular defect known to the parents, but a brother of the mother had a similar defect. The iris coloboma extended to the sclera, and the notched lower edge of each lens was clearly visible. The choroidal coloboma in the right eye extended a good deal higher than in the left, and in the right eye the optic disc was missing, altho the retinal vessels could be seen at the normal position of the disc. The vision was R. moving objects in the lower part of the field, L. 10/20 with a minus correction.

### Injury Involving Ciliary Body.

W. F. MATSON, Denver, again presented the case of magnet extraction of a foreign body previously shown at the February, 1924, meeting. The eye had been severely inflamed, but had become quieter after intravenous injection of sixteen grain doses of sodium salicylate every other day for several doses. There was very little vision, but the eye was fairly quiet, altho it would be removed if any decided exacerbation occurred.

*Discussion.* C. E. WALKER, Denver, suggested that on account of the wound being thru the ciliary body the eye was likely to get worse and it would be proper to remove it.

W. C. BANE, Denver, thought that the eye was improving and that it would be well to wait.

MELVILLE BLACK, Denver. After nine weeks the most dangerous period is past.

W. H. CRISP, Denver, emphasized the importance of considering focal infection in the presence of any ocular traumatism. It was a point which was often overlooked, the traumatism being regarded as sufficient explanation of any persistent inflammation, or failure to heal.

**Eversbusch Operation for Ptosis.**

W. C. FINNOFF, Denver, presented a woman aged nineteen years who had developed ptosis of the left upper lid after an injury, in which the skin and muscle and probably the periosteum, were peeled from the forehead downward to the root of the nose. The eye was blind, also as the result of the injury. An Eversbusch operation had been done to correct the ptosis, and then the eye had been enucleated.

*Discussion.* MELVILLE BLACK, Denver, who had seen the case before operation, remarked that the amount of scar tissue had rendered the outcome extremely doubtful from a cosmetic standpoint, and he complimented Dr. Finnoff upon the excellent result.

C. E. WALKER, Denver, who had also seen the case before operation, was surprised that it had been possible to relieve the ptosis.

**Penetrating Injury by Pin.**

D. G. MONAGHAN, Denver, presented a woman whose right eye had been penetrated by a pin which she had taken out of a portière. The pin had probably entered in the ciliary region, altho no wound of entrance could be made out. The pupil was elongated vertically. Vision was abolished, and there was no fundus reflex. The intraocular hemorrhage had gradually cleared up, leaving large floaters in the vitreous. It was now eighteen days since the injury.

*Discussion.* W. H. CRISP, Denver, suggested that the vision might clear much more in the course of a month or two.

MELVILLE BLACK, Denver, would use intravenous injections of sodium salicylate for five or six days.

EDWARD JACKSON, Denver, recalled a case in which, after traumatic intraocular hemorrhage, the patient had only

recovered normal vision after about eighteen months, and at the end of that time still had a partly cloudy vitreous.

**Recurrent Hemorrhage into Vitreous.**

D. G. MONAGHAN, Denver, presented a man who had come on account of loss of vision which was related to a large hemorrhage in the temporal half of the retina, as well as numerous small hemorrhages elsewhere. Wassermann, urine, and general physical examinations had been negative. There was infection of the tonsils, the ethmoid sinus, and eighteen teeth. After removal of six teeth in the course of twelve days, the patient had had a fit during the night, and the following morning the fundus reflex was completely abolished by fresh hemorrhage.

*Discussion.* EDWARD JACKSON, Denver, suggested that the anesthetic used for blocking the dental nerve might have been responsible for the epileptiform seizure.

**Steel Embedded in Sclera.**

F. R. SPENCER and C. L. LA RUE, Boulder, reported the case of a girl aged nine years whose right eye had been penetrated by a chip from a hammer five years previously. At that time the parents had been told that the foreign body was in the orbit, entirely outside the eye. The vision of the injured eye had been 4/60 on January 10, 1924. There was a cystoid cicatrix at the upper pole, and the fundus showed an area of chorioretinitis corresponding to this position. With Sweet's localizer the foreign body was localized exactly at the upper pole of the eyeball. After an unsuccessful attempt at removal with the giant magnet, the foreign body was removed by cutting down upon it thru the sclera and seizing it with a pair of forceps. It was deeply embedded in the sclera and choroid.

WM. H. CRISP, Secretary.

## SPECIAL REPORT.

### INDUSTRIAL COMPENSATION FOR OCULAR INJURIES.

WILLIAM M. SWEET, M. D.

PHILADELPHIA, PA.

This report is based on the Pennsylvania compensation law, but illustrates most of the difficulties and problems arising in connection with such legislation in other states. Read before the College of Physicians of Philadelphia, February, 1924. (See p. 870.)

The interpretation of the language of the Pennsylvania Compensation Law as it refers to the permanent loss of the use of an eye has been the subject of considerable controversy between employers and Referees of the Compensation Board. The law provides, under the Section relating to the schedule of compensation, for a disability partial in character 60% of the difference between the wages of the injured employee at the time of the accident and the earning power of the employee thereafter, but excepts from this clause certain particular cases, one of which is the eye. These exceptions are enumerated in a special clause (c), which says: For the loss of an eye 60% of wages, not exceeding \$20 per week, during 125 weeks. In the same clause it is provided that: Permanent loss of the use of a hand, arm, foot, leg, or eye shall be considered as the equivalent of the loss of such hand, arm, foot, leg, or eye.

The question of what constitutes the loss of the use of the eye is the point upon which difference of opinion has existed and still exists, and in several instances the courts have been appealed to in individual cases to decide the question.

For purposes of study we may divide the cases which have come before the Compensation Board into two general classes: (1) Cases in which the injury has resulted in a permanent reduction of vision not improved by glasses, and (2) cases in which there has been permanent reduction of vision as a result of injury, but in which sight may be improved to normal or nearly so by the aid of a glass. To the latter class are the cases of cataract, where after removal of the injured crystalline lens substantially normal sight is secured with a glass, but, owing to the lack of coordination of the two eyes when the strong lens is before the injured eye, the individual is unable to wear the glass.

A typical example of the first group of cases, in which as a result of injury there was a permanent reduction in vision not improved by glasses, came before the Superior Court of Pennsylvania, October term, 1922, on an appeal from an award by the Compensation Board and later judgment by a Common Pleas Court of Philadelphia County. (Fillip vs. the Cramp Shipbuilding Co.) The claimant was a machinist injured in the right eye in August, 1920. He received compensation up to November, at which time he executed a final receipt stating that the disability had ceased. He then returned to work at the same plant, but not the same character of work, and received the same rate of wages as paid before the injury. Following a strike and lockout at the shipyard, the man, in June, 1921, appealed to have the case reopened, as he said that he had lost the use of the eye as a result of the original injury. The case was heard by a Referee of the Compensation Board, who found the evidence insufficient to support the claimant's contention that he had suffered the permanent loss of the use of the eye. On an appeal from this decision of the Referee, the Compensation Board, from the same evidence, determined that the man had lost the use of the eye, and awarded him full compensation.

The Superior Court, in reviewing the evidence, stated that one oculist testified that the claimant had lost 5/25 of normal vision; another oculist that there was vision of 20/70, which he said corresponded with the other oculist's 5/25; a third oculist found vision of 20/50; while a fourth testified that the man had lost 56% of visual efficiency in the injured eye. The claimant testified that on account of the diminished vision he could not work as a machinist at the particular kind of work he had been doing at the time of injury, because it was occasionally necessary to use meas-

ures and gauges requiring good eyesight.

After referring to the decision of the Appellate Court of New York, Justice Linn says:

"We believe our ruling to be in accordance with the principle enunciated with much clearness by our Supreme Court. There, it was held that where a workman, who has lost an eye, entered employment in the course of which he lost his remaining eye, his employer was not liable for total disability, but only for the loss of one eye, in accordance with the schedule contained in section 306 of the Act, although the resulting disability was just as total as would be the loss of both eyes to a normal man. The expressions "loss" and "loss of the use" as used in section 306 should be given their unrestricted and ordinary use; and the claimant's eye or the use of it is not lost unless it is useless in any employment for which claimant is physically and mentally fitted."

In deciding the question the Court said:

"While the claimant had sustained an impairment of vision, he had been compensated for the loss only of earning power sustained, that is, from the time of the injury until he returned to work, and that unless he could establish the loss of the use of the eye he was not within the provision of the law compensating him for such loss. The evidence did not support a finding of the loss of the use of the eye, unless those words are employed in the statute in some special sense and not with their ordinary meaning. The position of the Compensation Board was that the claimant, with impaired vision in the right eye, could not thereafter do the particular kind of work he did before he lost the use of the eye within the meaning of the statute. Though we interpret the statute liberally to accomplish the remedial purposes of its enactment, we cannot adopt that meaning. The result would be that if injury to any member specified in clause (c) constituted permanent loss of the member whenever sufficient to disqualify for the particular kind of work in which injury was sustained, subsequent injury or injuries to the same member in different subsequent

employments would have the same effect, and the loss of the same member be thus compensated more than once, a condition which cannot have been intended. If it had been intended, clause (c) would have provided that permanent loss of the use of the member for the purpose of the occupation in which claimant was engaged at the time of injury should be considered as the loss of such member."

After citing several other decisions bearing on the subject, the Court said:

"We may hold that a man has not lost the use of an eye when the impairment of vision is not sufficient to disqualify him for employment for which he is mentally and physically qualified. The evidence does not justify the conclusion that the claimant is disqualified within the rule of those cases; there is evidence that he cannot now perform a certain kind of work he performed as a machinist, but that limited disability does not bring him within the provisions of clause (c)."

The Court reversed the decision of the Compensation Board and gave instructions to reinstate the conclusion of the Referee that the man had not suffered the loss of the use of the eye.

Whatever opinion we may have as to whether a man is entitled to compensation for the loss of one-half of the vision in an eye as a result of injury, we must recognize that the Court has no power to consider what may be an apparent injustice to the injured, but must decide the question of law as laid down by the statutes. A man who has suffered thru an injury a reduction in vision to 20/70 may still be able to do the same work as before and not suffer any reduction in earning power if the vision of the other eye is normal, but if in the course of his work he should lose the good eye, he certainly would not be able to do fine machine work with the other eye, which was shown by the evidence to have lost 56% of its normal efficiency.

The following case illustrates the second group of injuries in which a traumatic cataract was removed, with restoration of vision in the injured eye to normal with the aid of a glass. So far as the writer has been able to determine this was the first case of this character

to come before a Referee of the Compensation Board for decision.

C. E. H., an employee of the N. Y. & N. E. R. R. Co., was injured in the right eye by a piece of brass in May, 1916. A few days following the injury the writer made an X-ray examination of the injured eye, removed most of the swollen lens, and later extracted with forceps a small piece of brass from behind the iris. Three months later Dr. Paul H. Kleinhans, of Bethlehem, who had had the man under observation from the time of the injury, secured a vision of 5/5, partly, in this eye with glasses. The glass was not ordered, as the young man found that with the lens in front of the eye and the other eye uncovered there was dizziness and double sight. In September of that year the man petitioned the Compensation Board for compensation for the loss of the sight of the eye. The writer testified at the hearing that, except for the loss of the crystalline lens of the eye, the eye was healthy in all respects; that with a glass the sight could be improved to normal; that the glass required to secure this vision could not be worn, as with a strong glass before the injured eye and no glass before the other eye, the man immediately had double sight; that the man had not lost the use of the eye but was simply deprived of the coordinating power of the eyes when the lens was before the injured eye; that, as compared with an individual in whom an injury had been so severe that removal of the eyeball followed, the individual who had simply lost the crystalline lens had three distinct advantages: (1) there was no deformity as sometimes follows the removal of an eyeball and the wearing of an artificial substitute; (2) the man had protective vision on the side of the injured eye, and was therefore less liable to injury from machinery and while on the street than another person blind on one side from loss of the eyeball; (3) in the event of the loss of the other eye he would be able to wear a glass before the previously injured eye and secure normal sight.

The Referee in his report said that, in his opinion, the meaning of the law as applied to the term "the loss of an eye"

refers to the sight rather than the organ; that as a result of the injury the man had only 3/200 vision in the injured eye; that the use of the two eyes together was impossible with the correcting lens, and that the additional vision with the correcting lens was only available should the employee lose the sound eye. Under the circumstances, therefore, he considered that the claimant had lost the use of the eye, and awarded him full compensation for the term provided in the act.

The railroad company appealed from the decision of the Referee, and the case was reviewed by the Compensation Board in January, 1917, with the result that the decision of the Referee was affirmed.

The matter remained in this status until 1920, when a case came before the Common Pleas Court of Cambria County, June term, in an appeal from a decision of the Compensation Board (*Gerlesky vs. Portage Coal Mining Co.*). The claimant, a miner, was injured in January, 1918, as a result of which the crystalline lens of the eye was clouded. After operation for the removal of the cataract the claimant with the aid of a glass could use the injured eye. The Referee found that, as a result of the accident, the claimant without the aid of glasses had lost the use of the eye for industrial purposes, and, notwithstanding any ability to use the eye with the aid of glasses, required the payment of compensation for the total loss of the eye.

The Court, in summing up the evidence, said that "the question was, had the claimant lost the use of his eye for industrial purposes within the meaning of the Workmen's Compensation Law when the eye may be used with the aid of glasses." While the testimony as to the extent of the use of the eye was somewhat contradictory, the Referee, in order to dispose of the case, treated the matter as if substantially normal vision, in so far as the capacity to see with the injured eye was concerned, was obtained by the use of glasses. As there was no decision of the appellate courts of Pennsylvania or other State, except of the Appellate Court of New York, upon the precise question, and as the compensa-

tion law of New York was substantially the same as the Pennsylvania act in so far as it related to the question then before his court, and the precise question had been presented to the New York Court, the Judge quoted as follows the statement of the New York Court:

"Unquestionably, when the lens of the eye was destroyed, the use of the eye unaided was lost. It is only by providing an artificial lens outside the eye that the image could be so thrown on the retina as to restore the sight. The retina was not destroyed, and thru the use of an artificial lens the eye, so far as its use was concerned, could fulfill the natural functions of an eye. The claimant has permanently lost the use of the eye when so supplemented to the extent only of using it in conjunction with the other eye, which he cannot do, owing to the lack of coordination of images. Should the claimant lose his left eye he would be able, using the injured eye aided by a lens, to fully perform his duties."

The New York Court, upon the above reasoning, held that the use of the injured eye for industrial purposes had not been lost.

The Pennsylvania Judge then said:

"It is pointed out in the New York Case that, if the uninjured eye were destroyed, the claimant would be able with the aid of an artificial lens in the form of glasses to continue to do his work, which to our mind is a very conclusive argument sustaining the position that the use of the eye for industrial purposes is not lost because of the loss of the use of the lens which is part of the eye.

"While we are not bound by the appellate courts of any State except those of our own, yet it has ever been the practice to recognize and follow the decisions of the appellate courts of our sister States upon questions upon which there have been no decisions by the appellate courts of our own State. We consider the question in this case a very close one, and, even if it were not for the practice indicated, we would feel very much inclined to follow the decision of the New York Court, it being an appellate court of that State, and this precise question having been before it

for its careful consideration and decision."

The Court then reversed the decision of the Compensation Board, and the Board, upon the authority of the Court opinion, ruled that the claimant had not lost the industrial use of the eye.

The above decision would appear to settle the question that, in an injury to an eye in which cataract forms and is later removed, and the individual with the aid of a glass is able to see to do his work, altho not able to wear the glass owing to lack of coordination of the two eyes, there has not been industrial loss of the use of the injured eye. As the decision was that of a Common Pleas Court, it was not considered as final, as the writer later had two cases that were apparently parallel with the case above cited, in one of which, after the hearing before the Referee of the Compensation Board, the decision was made that the individual had lost the industrial use of the eye since he could not wear the lens required to improve the sight.

Irrespective of the decisions of the Compensation Board and of the Courts, there is one phase of the subject that is worthy of attention. Most of the large industrial establishments do not recognize any limit by statute of the medical and surgical aid which should be given to the man injured in their establishments, and direct that irrespective of expense and loss of time everything should be done to endeavor to restore the individual as far as possible to his previous state of efficiency. If cataract develops as a result of injury, the cataract is removed at a time when the operation may be done under the most favorable circumstances, so that the man may have protective vision on the injured side and have a reserve eye in the event of injury to the other eye. If it were desired to literally comply with the provisions of the Compensation Law, as defined by the Referees of the Compensation Board, a company would arrange for full compensation in all cases of injury in which a cataract formed, since no recognition is made for the services performed in restoring sight in the injured eye by removal of the cataract. Under these circumstances it would be

for the workman to have the cataract removed at his own expense and in his own time if he so desired.

In January last, the writer appeared before the Compensation Board in a case of cataract following injury by a piece of coal, in which after removal of the cataract practically normal vision in the eye was secured with a glass. As in all similar cases the glass could not be worn, and was therefore not ordered. The Referee awarded full compensation for the loss of the use of the eye, but recognized that the employer had performed a distinct service to the man in securing protective vision and providing him with a reserve eye in the event of injury to the other eye, and directed that in computing compensation to be paid there be a credit allowed to the employer for the expenses incurred in the operation for the cataract.

In January, 1924, Justice Keller, of the Superior Court of Pennsylvania, in a decision, gave the Court's interpretation of the section of the Compensation Law relating to the loss of the use of the eye, which apparently finally disposes of the claim, that an injured eye in which, after removal of the cataract, normal vision may be secured with glass is a lost eye industrially considered. The case was that of a miner who was injured in the left eye by a stone (*Massett vs. Armerford Coal Mining Co.*). There was a traumatic cataract which was later removed, and with a glass the man had 96% normal vision. As the man could not use the glasses for binocular vision, the Referee awarded 60% of his wages for 125 weeks, and the Compensation Board and a Common Pleas Court affirmed the award. The Superior Court in reversing this action said:

"The claimant's left eye is not destroyed. The lens, which focuses the light on the retina, is destroyed, but the retina is not, and with a correcting lens practically normal vision is obtained. Unfortunately the claimant cannot obtain

this vision while using the uninjured eye, for the two eyes will not coordinate and do not present the same picture to the brain. But the eye is not destroyed; it is rather in reserve. That it is a serious injury, and that it detracts from the value of the eye, there can be no doubt, but the eye is not lost. For if claimant should lose his right eye, he would be able, using the injured eye, aided by a lens, to fully perform his duties. Under the theory adopted by the Referee and the Board, it would be possible for this claimant to be twice awarded full compensation for the loss of each of his eyes, a condition which cannot have been intended; for his other eye could be injured just as this one was, and the vision be corrected by a lens, and then both eyes could be absolutely destroyed by accidents. This is, of course, not likely, but it is a possibility, and no one would object more vigorously than this claimant if following a similar injury to his right eye and his possession of normal vision in both eyes, if used separately, it should be held that he could not be compensated for future injury to either because both had been judicially determined to have been lost."

Since the above decision was rendered a case has come before the Workmen's Compensation Board on an appeal from the order of a Referee, who awarded full compensation to a man who, after removal of a cataract from the left eye, secured 20/40 vision with a glass. (*Wontrova vs. Philadelphia and Reading Coal & Iron Co.*). The Board, after a revision of the case, stated that the facts were practically identical with those of the *Massett* case, and that, since the man would have 20/40 vision in the left eye with a glass if he should lose his right eye, which under the decision of the Superior Court does not constitute the loss of the eye, ruled that the man had not lost the use of the left eye, and the order of the Referee was therefore reversed.

# American Journal of Ophthalmology

Series 3, Vol. 7, No. 11.

November, 1924

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

## EDITORIAL STAFF

EDWARD JACKSON, Editor,  
217 Imperial Bldg., Denver, Colo.  
M. URIBE-TRONCOSO,  
226 W. 70th St., New York City.  
MEYER WIENER,  
Carleton Bldg., St. Louis, Mo.

CLARENCE LOEB, Associate Editor,  
25 E. Washington St., Chicago, Ill.  
CASEY A. WOOD,  
7 W. Madison St., Chicago, Ill.  
HARRY V. WÜRDEMANN,  
Cobb Bldg., Seattle, Washington.

Original papers, correspondence, and other scientific communications should be addressed to the Editor. Books for review may be sent to any member of the editorial staff. Reports of society proceedings should be sent to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Ill.

Proof should be corrected, and returned within forty-eight hours to the printers. Reprints may be obtained from the printers, Tucker-Kenworthy Co., 501 S. La Salle St., Chicago, Ill., if ordered at the time proofs are returned. But reprints to contain colored plates must be ordered when the article is accepted.

Copy of advertisements must be sent to the Manager by the fifteenth of the month preceding its appearance.

The annual subscription for the JOURNAL and the OPHTHALMIC YEAR BOOK is eleven dollars, in advance.

Subscriptions, applications for single copies, communications with reference to advertising or other business, should be addressed to the Manager of Subscriptions and Advertising.

JEAN MATTESON, ROOM 1209, 7 West Madison Street, Chicago, Ill.

## ILLUMINATION FOR FIELD TESTING.

The work of the American Board for Ophthalmic Examinations seems to show, that more applicants for its certificate are poorly trained in testing the field of vision, than in almost any other department of clinical ophthalmology. It has been shunned as time consuming in practice, and uncertain in the results obtained from it. It is probably because of this attitude on the part of those teaching ophthalmology, that students have been permitted, if not encouraged, to neglect this important aid to diagnosis.

In all subjective testing there is the element of uncertainty that arises from making the patient an observer; and for such an unfamiliar thing as observing the boundaries of the visual fields, most patients require a good deal of training before fairly reliable results can be expected. How much time will be needed for each patient will depend on his special individual alertness and aptitude. But when a fairly intelligent patient has been properly trained a retesting, whenever useful, requires comparatively little time.

The uncertainty about the results obtained depends partly on the answers of the patient; but also, partly on the loose

methods and lack of standardized conditions under which such tests have been made. It is a fact of which ophthalmologists cannot be proud, that the best appreciation of the need for standardized methods and the best efforts to improve them in America, have come from laboratories of experimental psychology; and particularly that at Bryn Mawr. A contribution to such improvement we publish in this issue.

The language of experimental psychology is not exactly the language of clinical ophthalmology and it may require some close study to appreciate all that is implied in the observations recorded in that paper. But all our readers can make some comparison between the laboratory methods described and the ordinary clinical observations on which diagnoses are often based. A careful inspection of the fields illustrated, reading of results recorded in the tables and consideration of how far clinical observations may have been vitiated by neglect of standardized methods, is possible to all. A little thought on the significance of subjective tests as pointed out on page 849 will also be very profitable.

It is at least possible to make fairly constant in any office the condition of

illumination under which fields are habitually taken, especially by having a fairly neutral background without strong contrasts, taking the fields at the same time of day, if day light is used, or always by the same arrangement of artificial light. But especially it is possible to get a proper retinal adaptation by a few minutes closure of the eyes before making the tests. In taking the fields for a white test or stimulus, on a black or gray background, these precautions will give very good results. Only when it is attempted to determine the fields for colors do the precautions detailed in the paper above mentioned become important.

E. J.

### CHIROPRACTIC CURE FOR CATARACT.

In the September number of the *AMERICAN JOURNAL OF OPHTHALMOLOGY* (pages 720-723) we reviewed the pamphlet, etc. dealing with the book "Perfect Sight Without Glasses," by W. H. Bates, M. D. His treatment of cataract consisted in "relaxation of the mind and eye." Recently, our attention was called to the method of treatment of cataract as advised by the founder of the chiropractic school (?) of medicine; to "stand on the right side and adjust the 6th dorsal towards the left shoulder."

Unfortunately, we have not seen the book; and our informant does not state whether the position is the same for cataract of either eye, or of both. But we suppose the location makes no difference as apparently the etiology does not. The statement is made also, that "I have on two occasions caused plenty of hair to grow on bald heads; and on two heads have changed gray hair to black, by adjusting the 6th dorsal towards the right shoulder." It is, therefore, impossible, as may be inferred from Dr. Palmer's statement, for a man to have a cataract and at the same time either be bald or have gray hair.

A word of warning might be sounded for the benefit of those inclined to accept this cure, either as the treator or the treatee, viz., care should be taken not to adjust too far. Otherwise a case of

cataract might be transformed into a case of gray hairs or baldness, and vice versa. In view of the latter possibility, when our time comes to repair the ravages of nature, or in Chiropractic terms, when we find our 6th dorsal too far to the left, we shall stick to the time honored toupee and hair dye. And if, in the fullness of time, a cataract develops and we "try anything once," we shall certainly sue our chiropractors for malpractice if he slips our 6th dorsal over too far and robs us of our monthly trip to the barber.

C. L.

### OCULAR LESIONS OF KALA AZAR.

The two papers about these lesions, published in this number of our *Journal*, deal with a disease that has not before been brought to the attention of ophthalmologists. For many years the name "kala azar" has been applied to a contagious remittent fever, occurring endemically in China and India. It is very chronic, but generally fatal in the end. It was regarded as a variety of malaria, until Leishman and Donovan discovered the organism now known by their associated names.

The clinical diagnosis is fairly definite, but the microscopic diagnosis is made with the handicap that the organism is small, inconspicuous, and is abundant only in the spleen, liver, bone marrow and some of the lymphatic glands. It is a disease that heretofore has not been recognized far from its region of origin. But as it generally lasts for years, without making the patient helpless, isolated cases may be discovered anywhere in the civilized world. If, as has been suggested, the intermediate host is the bed bug, it may even become established in regions widely removed from its original habitat.

The eye lesions described as occurring in its course, while important, do not seem to belong especially to kala azar. They are not present in a majority of cases, nor are they characteristic of the disease. Some of those mentioned are quite accidental; as the trachomatous lesions of conjunctiva and cornea noted

by Dr. Lee, trachoma being excessively common in China. But the fundus changes, alteration of the color and appearance of the vessels, swelling and haziness of the retina, and hemorrhages doubtless belong to kala azar. They are, in general, similar to those of extreme anemia as developed in other diseases, notably pernicious anemia and chlorosis. Retinal hemorrhages and transudates, the most striking of the lesions, appear when the anemia has become very pronounced. With improvement in the general condition, they disappear rather rapidly.

Even more serious, tho less common, is the disorganization of the cornea similar to that produced by lack of vitamin in the diet. These lesions are of "A" interest of themselves and for the light they may throw on other eye lesions attending general diseases.

It is quite possible that increased knowledge of kala azar will throw some light on the essential nature of some of the conditions, like pernicious anemia, or the recurring hemorrhages into the vitreous in young people, long known but still obscure as to etiology. The effective treatment of the disease by intravenous injection of a preparation of arsenic suggests the possibility of optic nerve lesions from this drug. But so far nothing of this kind has been reported. The extensive trial of this line of treatment for kala azar, may help to show the real nature of the danger of optic atrophy and motor nerve lesions, when the arsenicals are used in the treatment of syphilis.

E. J.

#### A NEAR VISION TEST WITH NUMERALS.

A valued contributor writes thus to the editor:

"I happen to be the head of a clinic composed largely of immigrants and other persons who are unable to read

English. In testing their distant vision, we get along fairly well by the use of cards with numbers or the letter "E". In testing the near vision, however, we are frequently at a loss, because of the patient's inability to read either English or German, which are the standard test cards for near vision. Formerly, there were such cards with figures instead of letters, but I have tried in vain in recent years to obtain them, nor are they advertised in any of the catalogues of optical houses.

I have talked with other oculists who have had the same desire and same experience, and it has occurred to me that the Journal might be able to assist us. Would it be feasible for you or one of your collaborators to design a series of numbers in increasing sizes to take the place of or rather supplement the usual Jäger type? Personally, I would be glad to buy a dozen or more of such cards, I am sure that there would be a sale for them in sufficient quantities to pay for their printing by some optical house, if a recognized authority in ophthalmology would prepare them and thus guarantee their correctness."

On inquiry it appears that a test card for near vision, using numerals instead of letters, can be arranged without great difficulty and sufficiently exact for all practical purposes. Such a card will be prepared and every subscriber to the A. J. O., who cares for it, will have the opportunity of obtaining a copy at an early date.

#### OMISSIONS.

In the October number it was neglected to give due credit for the group photograph reproduced on page 810, to Dr. William C. Bane of Denver. The picture was taken after the first round table luncheon before some of the most important instructors had arrived to take part in the Course. Hence the absence of the faces of Drs. de Schweinitz, Duane and others.

## BOOK NOTICES

**Helmholtz's Treatise on Physiological Optics.** Translated from the Third German Edition. Edited by James P. C. Southall, Professor of Physics in Columbia University. Vol. 1, cloth, large 8 vo., 504 pages, 150 illustrations. Published by the Optical Society of America, 1924.

A well known portrait of Helmholtz, reproduced by photography, furnishes the frontispiece of this book; and, following the title page in English, is a reproduction of the title page of the third German edition, which was edited by Gullstrand, von Kries and W. Nagel. Next come the various prefaces, which record the development of this work. First is placed the preface to this edition written by the editor. It includes the list of thirteen collaborators that have helped in the translation, some history of how the different German editions were produced, and a statement of the way the Optical Society of America took up the reproduction of this classic treatise in English.

After this comes a translation of Helmholtz's preface to the first edition of this book. The first section had appeared in 1856 and the second in 1860. But this preface was included with the third and final section which is dated December, 1866. After the above comes the translation of the prefaces to the third German edition. The second edition was published in 1885. It had long been out of print, when, ten years after Helmholtz's death in 1894, Nagel undertook to edit the third edition. As he here states: "I had to admit that an adequate revision of the entire work was probably beyond the power of any single individual and certainly beyond my power. But this difficulty was quickly disposed of in the most satisfactory way when Professor Gullstrand and Professor von Kries consented to join me in the enterprise and to edit the parts on the Dioptrics of the Eye and The Visual Perceptions, respectively; thus leaving me free to devote my labors exclusively (except for certain essentially technical problems) to revising the sec-

ond part of the book, which is concerned with the subject of the "Visual Sensations." This preface appeared with the first volume in 1909. In 1910, the "third" volume appeared; and the "second" volume in 1911, with a preface by von Kries, Professor Nagel having died the preceding year.

The plan followed in the German edition and in this translation has been to republish the original treatise of Helmholtz, followed by the additions made by editors, to bring the account of each topic fully up to date. Most of these were made in the German edition by Nagel, Gullstrand and von Kries. But in this English edition there have been added a chapter on ophthalmoscopy by Professor Gullstrand, several special contributions by Professor von Kries and an article on color theory by Dr. Christine Ladd-Franklin. There are also inserted explanatory footnotes here and there by the editor or his collaborators.

The first part of this volume gives the anatomic description of the eye, 46 pages, as Helmholtz originally wrote it. To this has been added a bibliography of more recent descriptions, prepared by the translator of this portion, Dr. D. H. Hooker, of Pittsburgh. We think of anatomy as a finished subject, in which little remains to be discovered. But this bibliography occupies 7 pages, about 200 titles, altho it does not purport to be complete.

There is a short section, 7 pages, headed "Subdivisions of the Subject," which is occupied chiefly with discussion of the more general theory and relations of light. The theory of visual perception is divided into: The theory of the path of light in the eye; the theory of the sensations of the nervous mechanism of vision; and the theory of the interpretation of the visual sensations. To each of these branches is devoted a volume, the present volume dealing with the first.

Helmholtz's Treatise of Physiologic Optics begins with the dioptrics of the eye. It occupies 204 pages, taking up in succession: Optical imagery for spheric refracting surfaces; the optical system of the eye; blur circles on the retina; the mechanism of accommoda-

tion;  
mon  
tism  
tion  
Ther  
stran  
Opti  
in t  
Mech  
chro  
thal  
in th  
holtz  
stran  
holtz  
ston  
ogy.  
worl  
not  
subj  
clud  
the c  
sion.

Th  
be c  
cele  
(192  
holtz  
ber  
min  
the  
grea  
lesse  
have

W  
com  
its c  
Phy  
tific  
has  
resp  
ence  
to r  
whic

Gov

T  
pear  
the

tion; chromatic aberration of the eye; monochromatic aberrations (astigmatism); entoptic phenomena; illumination of the eye and the ophthalmoscope. Then follow the appendices of Gullstrand, 222 pages, under these headings: Optical imagery: Procedure of the rays in the eye; Refraction of the eye; Mechanism of accommodation; Monochromatic aberrations of the eye; Ophthalmoscopy. The last is not included in the third German edition of Helmholtz's work, but is a chapter from Gullstrand's book published in 1911. Helmholtz's "Physiological Optics" is a corner stone of modern, scientific ophthalmology. If any one should fear that a work published sixty years ago would not reflect the present knowledge of its subject, the work of Gullstrand, here included, with the explanatory notes of the editor, should remove that apprehension.

The Optical Society of America should be congratulated on the way it chose to celebrate the one hundredth anniversary (1921) of the birth of H. von Helmholtz; and particularly the "one member of the committee who was determined that no obstacles should stand in the way"—Mr. Adolph Lomb. It is a great monument to a great man; and in a lesser way it is a monument to those who have labored to build it.

We wish most heartily to echo these comments of the editor. "Apart from its own intrinsic value, the treatise on Physiological Optics is a model of scientific method and logical procedure that has hardly ever been excelled in these respects." "Certainly the very existence of this book in English should lead to new treatises and new text-books which are sorely needed at present."

E. J.

**Government Ophthalmic Hospital, Madras.** Report and statistics for 1923, Major R. E. Wright, I. M. S., Superintendent. Paper, quarto, 24 pages. Madras, The Government Press, 1924.

This series of reports has been repeatedly noticed in these pages; and the present number does not differ in

form, from those of other years (see v. 7, 1924, p. 940). Apart from statistical tables, there are 12 pages of scientific observations.

Cataract operations numbered 1613. Of these, 1452 were done as "ordinary Madras operations"; with 7 failures, including 2 cases of panophthalmitis on the third day, one of choroidal hemorrhage, one primary infection and three of secondary infection. In this operation, the capsule is opened with a needle before the corneal section is made, a method that has been practiced at Madras since 1879. Usually, the corneal section immediately follows the opening of the capsule, the puncture for the corneal section being made at the needle puncture. Usually, the anterior chamber remains sufficiently deep to make this easy. But in the rare cases, in which the aqueous drains away, the nozzle of the irrigator is applied to the puncture and the anterior chamber refilled.

In the above series there were 336 cases of simple extraction, with vitreous loss in 3. Among 740 done with iridectomy, 10 lost vitreous. Peripheral iridectomy after extraction of the lens was resorted to in 376 cases, and of these only 3 had vitreous loss. In this series a conjunctival flap was used, and only 1.8 per cent suffered iris prolapse. This is better than for complete iridectomy, 2.7 per cent, or for the simple operation, 12.7 per cent.

The conjunctival flap seemed to offer no protection from infection; which occurred 16 times in 690 cases, 4 primary and 12 secondary. In cases of corneal limbal incisions, there were 5 primary and 7 secondary infections.

Among the rarer conditions reported were 70 cases of keratomalacia. Sardine oil was tried in 22 cases, as a cheap substitute for cod liver oil. But it caused diarrhea and had to be discontinued. There was one case of cysticercus at the limbus and one of cysticercus at the apex of the orbit. There was also one case of rhinosporidium, and 7 cases of corneal ulcer infected with bacillus pyocyaneus.

For any one making a statistical study of ocular diseases, these reports must prove most valuable. E. J.

**Headache and Eye Disorders of Nasal Origin** by **Greenfield Sluder**, M. D., Clinical Professor and Director of the Department of Laryngology and Rhinology, Washington University Medical School, St. Louis, 272 pages, 115 illustrations, St. Louis, C. V. Mosby Company.

The introduction deals with the microscopic and gross anatomy of the nose.

Chapter I (27 pages) deals with Vacuum Frontal Headaches, Chapter II (40 pages) concerns the Nasal Ganglion Neuroses, and Chapter III (96 pages) treats exhaustively the subject of Hyperplastic Sphenoiditis. The remaining 68 pages are Case Histories.

This text was published in 1918 and has been widely read by oto-laryngologists. It represents a large amount of original anatomic research by Dr. Sluder. It records, too, his theories

regarding difficult clinical nasal problems.

This work has helped greatly to educate the oto-laryngologists as to the frequency of Vidian neuralgia, asthenopia, failing vision, or sudden blindness of nasal origin. It reminds one to watch for painful sinuses due to vacuum disorders altho not many are to be found.

The treatment outlined for cases diagnosed as nasal ganglion neuroses will probably never be generally used as the results obtained in other hands do not seem to coincide with those of Dr. Sluder.

The interpretations of pathologic specimens of intranasal tissue by Dr. Jonathan Wright are highly instructive.

This text is monumental. It will be referred to by all writers on the subjects treated for many years to come. Its content should be familiar to every otolaryngologist, and must claim attention from ophthalmologists.

John H. Harter.

## ABSTRACT DEPARTMENT

Reprints and journal articles to be abstracted should be sent to Dr. Lawrence T. Post, 520 Metropolitan Building, St. Louis, Mo. Only important papers will be used in this department, others of interest will be noticed in the Ophthalmic Year Book.

**O'Hare, J. P. and Walker, W. G. Arteriosclerosis and Hypertension.** Arch. of Int. Med., 1924, v. 33, pp. 343-349.

O'Hare and Walker studied the retinal vessels in fifty patients of varying ages with peripheral sclerosis and systolic blood pressure of less than 145 mm. Hg., and in a second similar group with systolic blood pressures of more than 145 mm. Hg. The diagnosis of sclerosis in the retinal arteries was based on compression effects at arteriovenous crossings and on irregularity of lumen, and, in the more severe cases, on "beading" and obliteration of the red columns thru increasing opacity of the arterial walls. In the nonhypertensive group, the average age was 55.6 years, the extremes being 13 and 82 years. All of the patients showed peripheral sclerosis

and more than half, marked sclerosis. Forty-four per cent showed no retinal arteriosclerosis; 38% questionable; 8% slight; 8% moderate and only 2% marked. In the hypertensive group, the average age was 52.6 years the extremes being 23 and 85 years. All of the patients had peripheral sclerosis; but it was moderate or mild in 66%, and it was marked in only 34%. Retinal arteriosclerosis was questionable in 2%, slight in 2%, moderate in 28%, and marked in 68%. The arteries were beaded in 8% and reduced to white lines in 8%. In neither group was there any quantitative relationship between the height of the blood pressure and the degree of retinal or peripheral sclerosis, tho in the hypertensive group, there was a tendency for high diastolic pressures to be associated with the higher degrees of retinal

arteriosclerosis. Thus of the hypertensive group, 68% showed marked retinal arteriosclerosis; while, of the non-hypertensive group, 82% had practically normal retinal vessels and only one showed marked sclerosis and this only in a single vessel. Of another group of sixteen patients with peripheral sclerosis and normal blood pressures but with a previous record of hypertension, fourteen had retinal arteriosclerosis, which was moderate or marked in nine.

The authors think it probable, therefore, that the finding of retinal arteriosclerosis in patients with a normal or low blood pressure indicates the previous existence of hypertension with a subsequent myocardial weakness or loss of vascular tonus. They believe that the determination of the presence or absence of retinal arteriosclerosis will aid in deciding which arteriosclerotic patients have a low blood pressure because of cardiac weakness and which have always had low blood pressure, an important question particularly from the point of view of prognosis. They think that the peripheral vessels play little or no part in hypertension, but that there is a definite relationship between small vessel sclerosis, as indicated in the retinal arteries, and high blood pressure, and that the retinal vessels are probably a fair index of the small vessels throughout the body.

H. P. W.

**Sedan, J. and Zucarelli, C. Exophthalmus from a Spontaneous Hematoma of the Orbit.** *Gaz. des Hôp.*, 1924, v. 97, pp. 385-388.

A woman of 40 years awoke one morning with a great proptosis of the left eye, without pain and without bruit. The conjunctiva was normal. The eye projected about  $1\frac{1}{2}$  cm., and was deviated obliquely downwards and outwards. Change of position of the body or head had no effect upon the exophthalmos. The mobility of the ball was greatly reduced. The lids were slightly swollen, there was much lacrimation, and the pupillary reactions were normal. V. = fingers at 0.3 m., refraction emmetropia. The fundus

was normal. Tension was 5 mm. Hg., V. F. normal.

General examination showed nothing, but blood and spinal fluid Wassermann's were both strongly positive. Diagnosis was that of a spontaneous hematoma of the orbit. Treatment: rest in bed and intensive antiluetic with mercury and iodid. Five days later, optic neuritis was found. On the sixteenth day, a central keratitis developed, which progressed so rapidly that it was thought a tarsorrhaphy, or evacuation of the orbit would be necessary. However, the condition improved, and the patient was finally discharged with a vision of 10/10 and normal position of the eye. The article is accompanied by a bibliography and two illustrations, one showing the proptosed eye and the other the appearance on discharge.

C. L.

**Hantke, H. Rare Case of Initial Sclerosis of the Eyeball.** *Klin. M. f. Augenh.*, 1923, v. 70, p. 184.

The lids of the left eye of a laborer were swollen, the ocular conjunctiva chemotic, partly thickened and a hard ridge, 1 cm. wide, occupied the whole lower portion of the globe. Cornea diffusely opaque; protrusion of the eyeball from 3 to 4 mm., motility limited on all sides. The patient stated that four weeks previously iron dust flew into this eye, and after four days he was exposed to draught on a train. A few days after admission, a papulous exanthema broke out on the whole body. A week later the left maxillary gland swelled. Wassermann positive. Repeatedly questioned the patient now admitted that he had an ulcer at the penis four weeks previously. A new infection was denied. Spirochetes could not be found in the sclerosis or in the papules and glands. The sclerosis did not ulcerate.

C. Z.

**Rochat, G. F. Corneal Lesion from Sulfuretted Hydrogen.** *Klin. M. f. Augenh.*, 1923, v. 70, p. 152.

About forty workmen of sugar factories complained of painful inflammation of the eyes. All showed intense

redness of the palpebral conjunctiva with swelling of the lids and moderate ciliary injection, and numerous minute erosions of the cornea, which explained pain. Washing with bichlorid of mercury solutions cured the affection in a little over a week. The disease was attributed to sulfuretted hydrogen, which with hot steam, struck the eye in opening the large boilers, in which the sugar beets were put, contaminated with sulfuretted hydrogen.

C. Z.

**Contino. Method for the Determination of Visual Acuity.** *Ann. di Ott. e Clin. Ocul.*, 1923, 51, p. 63.

The author points out that the systems now in use do not permit the recording of fine enough gradations in visual acuity for scientific purposes, and also with all such systems it is easy for the patient to learn the letters and to simulate either good or defective vision. With this in mind he has devised an instrument by which the retinal image of the standard test letter is enlarged or diminished by means of two convex lenses, a fixed convex lens of 15 cm. focal distance and a movable convex lens of 14 cm. focal distance. It was found that when the two lenses were 80 cm. apart the greatest magnification of the image was afforded (three times), while when the lenses were together the image was diminished to one-sixth its real size. Thus using a test letter which would be read by vision  $\frac{1}{4}$ th at five meters, by adjusting the lenses between 80 and 20 cm. all degrees of vision could be recorded between 1.5 and  $\frac{1}{12}$ . The "E" of Snellen's scale is used as the letter, mounted so that it may be turned in all directions. The patient sits at five meters distance from the fixed lens, and the lenses are gradually separated until the letter is perceived when the vision is read off on the scale attached to the instrument. The author's scale has 24 graduations, and by including the half intervals, 23 more graduations may be obtained. The instrument is called the Eidoptometer.

S. R. G.

**Ricci, E. Centesimal Luminous Optometer.** *Ann. di Ott. e Clin. Ocul.* Vol. 51, p. 965.

The author's instrument is devised to measure accurately differences of visual acuity as small as  $\frac{1}{100}$ . A projecting lantern is used and a lens of known focus. The size of the image of a test letter thrown on a screen may be made to vary by changing the distance between the apparatus and screen. Constant illumination, intense enough to obviate its influence on visual acuity, was used; and a special device which kept the image in focus at any given distance. An "E" is used, the image of which on the screen, when the lantern is at the nearest point to the screen, corresponds to vision of  $\frac{5}{4.5}$ . When the lantern is removed as far as possible from the screen, the same letter gives vision of  $\frac{5}{15}$ . Other larger letters are used in the same way, giving corresponding visual acuities less than  $\frac{5}{15}$ . The slide on which the apparatus is moved is fitted with a scale recording the vision obtained for each series of letters in  $\frac{1}{100}$ ths. The same apparatus may be used with colored letters for the detection of color blindness. Cases of malingering are easily detected by repeating the tests, which in malingerers invariably gives different results.

S. R. G.

**Berger, F. V. Ivanoff's Edema of the Retina.** *Ann. di Ott. e Clin. Ocul.* 1923, Vol. 51, p. 973.

Since Ivanoff's original report on this condition in 1869, there have been no further cases reported which included pathologic findings. The author's case was a man of 78 with poor vision in the left eye. Ophthalmoscopic findings showed both the central retinal artery and vein to be very thin. The central region was apparently edematous with a red spot at the macula. A diagnosis of thrombosis of a branch of the central artery was made. Nine months later the eye became blind and hard and was enucleated for pain. Sections showed no demonstrable edema in the central region, indicating that the results of the

thrombosis had partially cleared up. There was extreme arteriosclerosis of the small vessels in this region, however, most of which were almost occluded by their hyalin walls. These changes were much more marked in the periphery where the edema as described by Ivanoff was present. It consists in a series of cavities in the retina filled with fluid, the cells on each side being compressed to mere threads. This condition was found only near the region of the ora serrata, the typical site according to Ivanoff. This fact, according to the author, is probably due to the greater degree of arteriosclerosis in this region.

S. R. G.

**Highet, H. C. Recurrent Detachment of the Retina.** *Brit. J. Ophth.*, v. 8, 1924, p. 226.

In reply to Sir William Lister's third request (*B. J. O. Jan.*, 1924) for reports of the practical experience of surgeons in the treatment of this class of cases, the author ventures the following report. A lady, aged 61 years, suddenly lost the sight of her left eye. There were no inflammatory signs; tension normal; pupils equal. The ophthalmoscope did not reveal the slightest red glare. No light perception. Five percent dionin and rest in bed were ordered. In one week's time vision returned. The ophthalmoscope showed no corneal or lens defect; the vitreous showed a general haze and two cobweb like floating opacities; no evidence of detached retina. Twenty-two days after the onset, the general vitreous haze had cleared, and the two large opacities were much less dense. The patient was allowed to leave her bed.

About two months after the onset the sight suddenly failed again, this time beginning in the lower field. In the lower field was an absolute scotoma. Corresponding to this a detachment was discovered involving nearly the whole upper half of the retina. Following three weeks' treatment the detachment disappeared. Four months after the initial detachment and about two and a half months after the onset of the second, a third one occurred just as suddenly in the lower half of the

retina. Under treatment the retina became replaced at the end of five weeks. In the ensuing three and a half months no further disturbance has been noted.

In spite of the fact that no hole has as yet been detected in this case, the history of three consecutive detachments and the evident fluid character of the vitreous entitle us to infer the presence of a hole in the retina.

D. F. H.

**Szily, A. v. Hair Formation in the Meibomian Gland and Distichiasis Congenita Vera.** *Klin. M. f. Augenh.* 1923, v. 70, p. 16.

A boy, aged 15, had from birth on the inner side of the edges of all four lids a second row of cilia (from 30 to 36), at the site of the Meibomian glands, arising from the ducts of the glands. On the everted lid the hairs showed thru the yellowish ducts covered by conjunctiva. Their length on the upper lid was about 8 mm., on the lower lid 5 mm. The corneas showed irregular old opacities with abundant vascularization from below. The boy could never look well into the light, and looking upwards was hindered by the friction from the posterior row of cilia. The posterior layer of the lid was detached by an intermarginal section and the posterior border bearing the lashes was removed by an incision parallel to the lid margin.

A very minute microscopic examination of the reconstructed models of the glands is given. According to the facts presented, distichiasis congenita vera is a real idiopathic, recessively hereditary malformation. The posterior row of lashes does not consist of displaced cilia, but has the character of rudimentary Meibomian glands. With greatest probability, they are phylogenetic intermediate stages of that transmutation, thru which the common hairs, some time in their transition to Meibomian glands, passed in the ancestors of the now living mammals.

C. Z.

**Woods, Alan C. and Moore, Jos. Earle. Visual Disturbances Produced by Tryparsamide.** *Jour. Am. Med. Assn.* v. 82, No. 26, pp. 2105-2111.

The authors' summary is as follows:

1. Visual disturbances produced by

tryparsamide may be divided into the classes of subjective and objective. The symptoms of dim or dazzling vision are common to each class. In the subjective group, ophthalmologic examination gives negative results. In the objective group, the striking ophthalmologic change is constriction of the visual fields for form, without scotomas, and with or without diminution in the visual acuity.

2. In patients with reactions of the subjective type only, it is usually possible to administer more tryparsamide without further difficulty.

3. If objective evidence of visual damage is present, the drug should be permanently withheld.

4. Among 241 patients, who have received more than 3,000 injections of tryparsamide, 10.2 per cent have developed reactions of the subjective group, and 5.5 per cent, the objective type of visual disturbance.

5. Ninety-four per cent of all reactions occurred early in the course of treatment, by the time of the tenth injection.

6. Visual disturbances bear no direct relationship, within certain limits, to the dose of the drug administered.

7. Disease of the central nervous system, especially general paralytic and tabetic neurosyphilis, is to some extent a predisposing factor to visual disturbance from tryparsamide.

8. Preexisting syphilitic disease of the optic nerve or retina is not necessarily a contraindication to the use of tryparsamide.

9. It is probable that the drug exercises in some instances a direct toxic action on the retina, or the optic nerve.

10. Before beginning tryparsamide therapy, every patient should be examined by a competent ophthalmologist; as to visual acuity, fundi and visual fields. The occurrence of any visual disturbance must form the occasion for a second examination.

11. In the present status of our knowledge of the drug, its use should be strictly limited to the treatment of trypanosomiasis and neurosyphilis.

The evidences of visual damage, that can be determined objectively, are con-

traction of the fields and diminution of central vision. These are accompanied by subjective symptoms. L. T. P.

**Szily, A. von. Experimental Transmission of Infection from Globe to Globe. Sympathetic Ophthalmia and the Pathogenesis of Hematogenous Herpes of Cornea.** *Klin. M. f. Augenh.* 1924, v. 72, p. 593.

Von Szily scraped the loose epithelium of the cornea in recent herpes of the human cornea, and inoculated the cornea of rabbits with it. After the accumulation of herpes virus in the inoculated, typically reacting cornea had reached its culmination point, generally within two or three days, there was sufficient material for about five or six further inoculations. An incision 6 mm. long was made in the upper portion of the transparent cornea of a second rabbit with a cataract knife, and with a bent spatula the root of the iris and the ciliary body were to a small extent detached from the inner surface of the sclera. Then the epithelium of the inoculated cornea was scraped and, with a bent forceps, introduced into this pocket of the suprachoroidal space. This produced a severe plastic uveitis which, without the least signs of a purulent infection or common bacteria, lasted several weeks, until the eye became pale with remaining structural changes and opacities.

On the fourteenth day the untouched left eye exhibited moderate pericorneal injection and a marked iritis with small hemorrhages, exudation at the pupillary margin and synechiae. The whole fundus was almost whitish and the disc just visible, red, the tortuous vessels surrounded by small hemorrhages partly covered. This occurred in over ten per cent of the inoculations.

The infiltration of the choroid consisted of lymphocytes and epithelioid cells. In the infected eye the propagation of the infiltration from the inflamed and the thickened choroid into the stem and the sheaths of the optic nerve, could be seen distinctly. The lymphocytic infiltration of the optic nerve continued over the chiasm, over

the other nerve and into the tract; and there was a pronounced cerebral leptomeningitis. The author leaves it undecided whether the noxious substance reaches the other eye thru the optic path, or whether the meningitis and the affection of the second eye are caused thru metastasis from the blood current.

A second phenomenon on the second eye was observed in 50 per cent, i.e. metastatic herpes of the cornea. This will offer an opportunity to study the pathology of the herpes corneae in its material aspects in all stages clinically and microscopically.

C. Z.

**Guillery, H. Experimental Sympathetic Ophthalmia in the Rabbit.** Arch. f. Augenh. 1924, v. 94, p. 143.

In a former article (Amer. Jour. Ophth. May 1924, p. 409) Guillery gave the first experimental proof that a reaction from the toxin of a distant tuberculous focus may occur in the eye, producing marked tuberculoid changes. Utilizing this for the study of sympathetic ophthalmia, he inflicted injuries of various kinds on the eyes of rabbits, the animals having been infected with tuberculous material enclosed in sacs impermeable to bacilli which had been introduced into the peritoneal cavity. The results were negative. Also the results of the marked retention of the toxin by the liver, after introduction of the sac into other parts of the body, were doubtful in the author's mind. He therefore introduced the sacs with the tubercular contents into the vitreous, and produced in all his experiments a marked tuberculoid affection of the choroid which corresponded in all essential points to the inflammatory characteristics of the exciting eye in man, and in every case a sympathetic inflammation of the second eye. From these experiments the author considers the toxic interpretation of sympathetic ophthalmia very much supported, indicating the blood current as the path of conveyance of the toxin to both eyes.

If in the second eye the disease is established thru the products of tissue

disintegration and the tuberculous toxin, enucleation of the first eye cannot arrest this process. It need not be ascribed to the first eye because the same process has developed in the second eye. The changes found speak against the assumption of tuberculosis by liberated bacilli. Apparently the toxins which the bacillus in the tissue discharges are different from those which produce distant reactions.

The author then summarizes the essentials of the pathogenesis. The traumatism furnished, by subsequent disintegration of tissue, the degeneration products which cause the toxic uveitis. Possibly at this period the uvea of the second eye shows changes of which the clinical demonstration is scarcely possible. Usually the products of degeneration will slowly become exhausted. Therefore, not every traumatism leads to sympathetic ophthalmia. It is only if the action of a distant tuberculous focus is added that stronger toxins develop which are more or less renewed from this focus. By progressive disintegration of tissue and added toxin, the vicious circle for both eyes is closed. This view is supported by the experimental, histologic and clinical observations.

C. Z.

**Heine, L. Long Duration of Tuberculosis, Lues and Sympathetic Ophthalmia.** Klin. M. f. Augenh., 1923, v. 71, p. 70.

A diffuse and disseminated chorioretinitis with ring scotoma and temporal contraction of the visual field, existing for fifty years in a woman, aged 65, showed within the last few weeks a considerable improvement. Under milk therapy vision increased from 1/60 to 1/9. This makes it seem probable that such a process may be rekindled after fifty years.

In another case of tuberculous uveitis in a young man, whose eye seemed without irritation for years, recent infiltrations of the iris and ciliary body were observed anatomically.

A typical case of luetic parenchymatous keratitis in a child, aged 14, presented after twenty-two years, recent corneal infiltrations, altho clinically

this eye appeared without irritation.

A perforating injury of the eye of a child, aged five, was treated with prophylactic mercurial inunctions. After two months, sympathetic ophthalmia developed. This recurred twice a year for sixteen years. Heine warns against large doses of salicylate, which may cause a chronic nephritis.

In another case, cilia were impacted in the ciliary body by a traumatism. Hypopyon occurred. Three days after enucleation, sympathetic ophthalmia arose. There was a striking resemblance to tuberculosis. The disease ran an unfavorable course.

In a case of a perforating injury in a boy, aged 6, sympathetic ophthalmia followed an iridectomy which was performed one year after the original accident. Apparently the sympathetic ophthalmia, latent for a long period, was mobilized by the iridectomy.

A case of sympathetic ophthalmia in a boy, aged 5, was cured by milk injections. The cure endured for three years.

C. Z.

**Rochat, G. F. and Steyn, J. S. Influence of Calcium Chlorid on the Production of Ocular Fluid and on Ocular Pressure.** *Brit. J. Ophth.*, v. 8, 1924, p. 257.

This contribution details the observation in a series of experiments prompted by the work of Chiari and Januschke in inhibiting or preventing the chemosis which appears after the instillation of a drop of mustard oil into the eye of a rabbit.

The investigators found it preferable to observe manometrically, the influence of calcium chlorid upon an eye in which there was a slight underpressure. Using the tonometer, the tension was found to vary correspondingly with the increased and decreased production of ocular fluid.

It was noted that during an average of twenty minutes after the injection of calcium chlorid the production of ocular fluid was considerably increased. This period of increased production was followed by a period of distinct decrease of production of much longer duration.

The experiments clearly show that it is possible to inhibit the production of fluid in the eye by the administration of calcium chlorid. In the case of man, it is only possible to administer calcium chlorid by the mouth, as subcutaneous injections cause extensive necrosis of the skin, and intravenous injections of any considerable quantity are dangerous on account of their action on the heart. Further investigations must teach us how far it is possible, in the case of man, to inhibit the production of intraocular fluid by intestinal administration of calcium chlorid.

Four tables and four illustrations accompany the contribution.

D. F. H.

**Blatt, N. Treatment of Trachoma by Parenteral Milk Injections.** *Klin. M. f. Augenh.*, v. 65, Nov. 1920.

Blatt selected from his extensive trachoma material, 150 typical and advanced cases and divided them into three groups. Group 1 was treated with parenteral milk injections, 10 cub. cm. intragluteally every two days, and locally 3 per cent boric acid solution. Group 2 received milk and local treatment: application of 1 per cent nitrate of silver, expression of the granules after the method of Kuhnt, and in a proportion of cases the author's "Aspiration" treatment (*Wien. klin. Wochenschrift*, 1918), atropin and 3 per cent dionin ointment. Group 3, no milk; only drug and mechanical treatment. In each group were represented: 10 cases of granular conjunctivitis without corneal complications; 10 cases with pronounced papillary hypertrophy and rare granules; 10 cases with marked diffuse swelling and redness of the conjunctiva with succulence and fold formation at the lines of reflection. Further 10 cases presented typical pannus trachomatousus and the last 10 had complications common to trachoma such as diffuse and circumscribed infiltration and corneal ulcer. The treatment extended over three months without a break. Loss of body weight was not observed in the patients who received milk injections. Sudden exacerbation of the irritative

state of the eyes was absent. Pronounced hyperemia or edema of the conjunctiva was never noted, even when the temperature rose to 40° C. after the injection. Prowazek bodies were present before and after the injection in approximately equal numbers, and the number of leucocytes in the secretion also remained about the same. Final results after three months: Group 1—(effect of abstinence from local treatment) 22 cases worse, 28 cases unchanged, in no cases improvement. Group 2—(milk and local treatment) 3 cases worse, 31 cases improved, 16 cases unchanged. Group 3—4 cases worse, 34 improved, 12 unchanged. No marked preponderance was observable, with regard to results, in either group 2 or 3.

After discussing the theories which obtain with regard to the mode of action of parenteral milk injections, Blatt comes to the conclusion that milk injections have no action on the trachomatous process.

St. John.

**Blatt, N. Fundus Anomalies in Cases of Anisometropia.** Graefe's Arch. f. Ophthal. v. 112, p. 1923.

The author supports the view that amblyopia from nonuse of the eye does not exist, that the weak sight of anisometropic subjects is caused rather by objective changes. Among 429 cases of advanced anisometropia, amblyopia was frequently absent; when present there were to be observed either ophthalmoscopic alterations or at least anomalies with regard to the visual field or color vision. In the present publication the fundus changes are alone dealt with. The following were noted:

More or less significant changes in the fovea centralis. These correspond in their clinical aspects to hereditary disease of the macula (Behr's heredo-degeneration of the fovea) which, as the literature on the subject shows, is accompanied in almost 50 per cent of cases by anomalies of refraction. The cause is congenital and dates back to embryonic development. There were further noted anomalies of the fovea with respect to size, form and position, as well as the character of the

pigmentation both of the fovea and its neighborhood (irregular central pigmentation or unusual poverty of circumfoveal pigmentation). To this group belong also aplasia or absence of the fovea as observed in albinos.

Disturbances of development affecting the papilla (with or without foveal changes). In this class the author places conus formation and choroidal atrophy, in both of which the extension hypothesis is to be discarded in favor of a congenital cause. The optic nerve can further present anomalies with regard to form and color; and to this class belong such affections as coloboma, pseudoneuritis and discoloration of the papilla, mostly in the form of congenital hereditary optic nerve atrophy. In connection with this class the author describes a case of congenital optic nerve atrophy which was probably related to co-existing myxedema:—Anomalies of the blood vessels of the retina, which of course do not account for a pronounced amblyopia, but can be productive of other very important changes, which in numerous instances were combined. To this group belong the complete and incomplete inverse type of papilla. Opticociliary and cilioretinal vessels are further mentioned, and also tortuosities of the vessels. With the above mentioned anomalies there are often combined abnormal conditions of pigmentation, but these are also found in amblyopic eyes as the sole existing alteration. Blatt attaches to these, in such cases, a causative value, and is of the opinion that the conditions of pigmentation exert a real influence on visual acuity.

In school children normal and supra-normal acuity of vision was more frequently associated with a dark fundus than with a fundus poor in pigment. The good vision of negroes must be connected with the richness of their pigmentation, and the weak sight of albinos with their poorness in pigment.

The anomalies of pigmentation can be, in general, divided into three groups: irregular distribution, abnormal poorness and abnormal wealth of pigment. The last mostly takes the form of massed deposits of pigment

(melanosis). It is remarkable that the numerous published cases of unilateral hyperpigmentation (melanosis) are so frequently associated with ametropia.

A rare developmental anomaly is so-called "Aplasia of the fundus" which is characterized by small, pale papilla, smallness of the blood vessels (including those of the choroid), and rarefied pigmentation. Another is coloboma of the choroid. Of course there exist also early acquired alterations which, in cases of anisometropia can lead to an erroneous diagnosis of "amblyopia ex anopsia", for example, congenital syphilitic retinochoroiditis, the sequelae of retinal hemorrhages in the fovea during birth, and so on. For the ophthalmoscopic examinations red free and reflected daylight should be used in addition to the usual methods.

The practical deduction resulting from the author's studies is that patients with "one sided amblyopia ex anopsia" should not be needlessly subjected to troublesome visual exercises.

St. John.

**Young, George. Operation for Congenital Ptosis.** *Brit. J. Ophth.* v. 8, 1924, p. 373.

The author has devised an operation which he performed on a young woman with a monocular congenital ptosis. There were no disfiguring after effects from the operation. The elevation of the eyebrow and wrinkling of the skin in the frontal region were done away with.

The superior rectus muscle was exposed for about one centimeter up its fleshy belly. With a strabismus hook the eyeball was depressed to the extent of a maximal contraction of the inferior rectus. The upper lid was now everted, and where the upper edge of the tarsus crossed the belly of the muscle, the latter was refreshed transversely for its whole width by scraping it with a sharp scalpel. Then the upper end of the tarsus was exposed exactly to the extent of the width of the muscle, and by means of three silk sutures, one taking in the central fibers of the muscle, the other two taking in edges, the whole width of the superior rectus muscle was firmly su-

tured to the tarsus. This fixed the central and nasal portions of the eyelid, but should the lateral part still sag, a point of attachment between the edge of the tarsus and the sclera can be added then and there, or later.

Lagophthalmos present immediately following the operation disappeared promptly. Ten months later the lids were in excellent condition. Blinking was developed by practice before a mirror.

The author suggests continuing the sutures thru the lid as probably a good modification of the operation. Two illustrations accompany the contribution.

D. F. H.

**Lister, Sir William. Concussion Changes Met with in Military Practice.** *Brit. J. Ophth.* v. 8, 1924, p. 305.

The author divides his subject into five headings.

1. Ruptures of the sclera. While in civil life ruptures are usually concentric with the cornea, in military practice the cornea may burst forward, equatorial ruptures may occur or the whole sclera may be split into lobes. There are two main groups; those in which the missile has penetrated the globe, and those in which the missile has not penetrated the globe. In the former, if the missile passes thru well back in the globe and is large enough, the cornea is shot forward and the contents ejected. If it enters the front of the eye, there is an explosive effect splitting the sclera into numerous lobes. In one penetrating injuries, waves of pressure are set up rupturing at various points opposite the point of impact.

2. Concussion changes of the iris and ciliary body. Such eyes are seldom removed, hence the difficulty in examining pathologically. Displacement of the iris centrally gives rise to the D-shaped pupil; much rarer is the dislocation of the iris peripherally, which produces a pear shaped pupil. The latter is accounted for by reflection of the iris or a rent in the ciliary body which may be a separation of the circular from the longitudinal fibers. The rent may occur at the junction of

the ciliary body with the sclera. When the cornea is indented, the pressure of the aqueous forces back the iris against the lens, and therefore, no fluid can pass thru the pupil with the result that something must give way.

3. Concussion changes in the retina and choroid. In civil life such injuries are due to comparatively slow moving objects causing disturbances in the macular and perimacular region such as commotio retinae, detached retina, hemorrhages and retinal rents. While in military practice this type was observed, yet, rapidly moving missiles gave rise, when examined early, to great red clouds of hemorrhage in the retina interspersed with glistening white areas. Examined later the glistening white areas had vanished and the hemorrhages for the most part had been absorbed and were largely replaced by fibrous plaques with festooned margins. These changes occurred in the area adjacent to the site of the impact, in the macular region or, in a few instances, opposite the site of impact.

4. Evulsion of the optic nerve. The special feature in this condition has been thought to be a mass of fibrous tissue covering the disc and disappearance of the blood column, but an an-

terior division of the nerve by a missile will produce the same picture. It is probable that only in those cases where the optic disc is unobscured by hemorrhage or fibrous tissue, and a definite pit is seen at the site of the nervehead, can one state with certainty that evulsion has taken place. The nerve must be either pushed in or pulled out. The lamina cribrosa breaks and the nerve is expelled. Blows on the front of the eye, penetrating wounds of the orbit or globe are the usual types of injury causing this condition.

5. The effects of foreign bodies striking the retina. Foreign bodies striking the retina may remain embedded. They may perforate or may rebound, in some instances striking more than one point. Lesions above or below the horizontal plane caused a defect in the field out of all proportion to the local disturbance. There was a "distribution defect." The nearer to the disc the greater the blind sector. If the lesion occurred in the horizontal line there was no "distribution defect." Thirty-four beautiful illustrations comprised of fundus pictures, microphotographs, fields and diagrams accompany the contribution.

D. F. H.

## NEWS ITEMS

### DEATHS.

Dr. Arthur H. Kimball, Washington, D. C., aged forty-nine, died August twenty-fourth of uremia.

Dr. Alexander C. Magruder, of Colorado Springs, died October 11, 1924, about a week after operation for malignant disease.

Dr. Henry Parent, formerly president of the Ophthalmologic Society of Paris, died recently, aged seventy-five.

Mr. George H. Oliver, Bradford, England, formerly lecturer in ophthalmology, University of Oxford, died April fourteenth, aged sixty-three.

### PERSONAL.

Sir Arnold Lawson has been elected president of the Ophthalmological Section of the Royal Society of Medicine for 1925.

Doctors Woodruff, Joliet, Illinois, announce the association with them of Dr. George H. Woodruff after September first, 1924.

Dr. Herminio Velarde has been appointed associate professor of ophthalmology to the College of Medicine, University of the Philippines.

Col. Harry V. Würdemann was elected President of the Reserve Officers Association of the State of Washington at the Annual Meeting held at Camp Lewis.

Mr. E. Treacher Collins has been elected president of both the Council of British Ophthalmologists and of the Ophthalmological Society of the United Kingdom for 1924-25.

Dr. Harvey J. Howard, professor of ophthalmology, Union Medical College, Peking, China, gave an illustrated lecture before the Summit County Medical Society, Akron, Ohio, August eighteenth.

Dr. Frederick H. Verhoeff, Boston, has been appointed professor of ophthalmic research in the Medical School of Harvard University, and Dr. George S. Derby has been appointed Williams' professor to succeed Dr. Alexander Quackenbos.

Dr. A. F. MacCallan, formerly of Egypt, has been appointed Consulting Ophthalmic Surgeon to the Cassel Hospital for Functional Nervous Disorders, London.

Dr. Archibald C. Lewis wishes to announce that his brother Dr. Philip M. Lewis is now associated with him for the practice of ophthalmology and otolaryngology, 1224 Exchange Building, Memphis, Tenn.

A dinner was tendered Dr. Alexander Quackenbos at the Harvard Club on February twenty-fifth, 1924, by the Board of Managers of the Massachusetts Eye and Ear Infirmary, the staff participating, in recognition of his long and untiring service of thirty years.

Dr. Harry V. Würdemann of Seattle last April presented the Charles B. Hopkins Chapter of the Telephone pioneers of America with original drawings by Alexander Graham Bell to illustrate the official announcement and description of his surgical telephone probe.

Dr. L. Webster Fox, after a two months' trip in the West, has returned home. Four weeks of this time were spent among the Blackfeet Indians in Glacier National Park where he held a trachoma clinic, operating upon the Indians and instructing the local men how to perform a resection of the tarsus. The Indians were so appreciative that they adopted him into their tribe and bestowed upon him the title of Chief Eagle at a most impressive ceremony.

The Ophthalmic Staff changes in the Massachusetts Eye and Ear Infirmary are as follows: Resignations, Dr. William N. Souter as Assistant Ophthalmic Surgeon. The following appointments have been made: Dr. Harold B. Chandler, Assistant Ophthalmic Surgeon; Dr. Ralph H. Ruggles, Assistant Ophthalmic Surgeon; Dr. Robert C. Cheney, Assistant Ophthalmic Surgeon; Dr. Edward B. Dunphy, Ophthalmic Clinical Assistant; Dr. Alphonso F. Raynes, Ophthalmic Clinical Assistant; Dr. J. Herbert Waite, Teaching Fellow in Ophthalmology.

Dr. Derrick T. Vail and his son Dr. Derrick Vail, Jr., left Cincinnati the last of October for Shikapur and Moga, India. Dr. Derrick Vail, Jr. graduated from Harvard in 1923 and has just finished training in the Massachusetts Charitable Eye and Ear Infirmary as intern. Dr. Vail is giving his son this unusual opportunity for developing manual dexterity in cataract and glaucoma operations as performed in India. They expect to return about May first.

#### SOCIETIES.

The French Ophthalmologic Society has announced that its next meeting will be held at Brussels, May eleventh, 1925.

The Twenty-seventh General Meeting of the Japan Ophthalmological Society was held on the 2nd and 3rd of April in the Niigata Medical College. Some two hundred members participated.

The Montreal meeting of the American Academy of Ophthalmology and Oto-Laryngology, held September 16-18, was scientifically up to the usual high standard of the Academy and socially a very pleasant gather-

ing. The course arranged for the Section on Graduate Study began Thursday evening, the 18th, with a symposium on "Diabetes," and continued thru Friday and Saturday. Lt.-Col. Henry Kirkpatrick, formerly of Madras and now of London, in addition to his address before the Academy as its guest of honor, gave an interesting lecture on "Trachoma," to the Section on Graduate Study. Dr. A. Fuchs, passing thru this country, on his way from Peking, China, where he served a year as visiting professor in ophthalmology, attended the meeting and took part in a discussion on "Papilledema," which was one of the high points in the scientific session.

The program this year was arranged so that the two sections of the Academy on Ophthalmology and on Oto-Laryngology did not meet at the same time, but any member could attend all the scientific sessions. Next year the meeting of the Academy will be held in Chicago. Dr. Horace Newhart, of Minneapolis, was elected President and Dr. John M. Wheeler, of New York City, First Vice-President.

The official invitation to the Academy to participate in the convention of English speaking ophthalmologic societies, to be held in London, July 13-17, 1925, was ably supported by Dr. W. G. M. Byers of Montreal, and Dr. George E. de Schweinitz of Philadelphia. Dr. Walter B. Lancaster of Boston, was appointed the official delegate to represent the Academy on that occasion; and a Committee was authorized to bring the matter before the Fellows in the hope that a large number of them would arrange to attend the Convention.

#### MISCELLANEOUS.

The Massachusetts Charitable Eye and Ear Infirmary has changed its name to Massachusetts Eye and Ear Infirmary.

The state board of health has arranged for a trachoma clinic, to be held at Columbia, Missouri, September 24-25, by Dr. R. L. Russell, director of the Division for the Prevention of Blindness, in cooperation with a representative of the U. S. Public Health Service. The private railroad car is equipped with facilities for treating trachoma and will be routed to fifteen communities in the state during September and October. Dr. Russell states, it is reported, that clinics have been held in more than fifty counties in the state and that trachoma prevailed to some degree in all of them.

Professor Rollet, of Lyons, France, assisted by Drs. Bussy, Rosnoblet, Colrat and Malot, will give a course in ophthalmology, which will begin Monday, November 10, 1924. There will be clinical examinations, practical operative work in ophthalmology and laboratory work with optical instruments, electrogoniometer, etc. The practical lessons and exercises will take place during the two weeks in the ophthalmic clinic. A certificat d'assiduité will be given at the end of the course. Further information may be obtained by addressing the Secretary of the Faculté de Médecine, quai Claude-Bernard, Lyon. The fee is 150 francs.

## Current Literature

These are the titles of papers bearing on ophthalmology. They are given in English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically, usually by the author's name in **heavy-faced type**. The abbreviations mean: (Ill.) illustrated; (Pl.) plates; (Col. Pl.) colored plates. Abst. shows it is in an abstract of the original article. (Bibl.) means bibliography and (Dis.) discussion published with a paper. Under repeated titles are given additional references to papers already noticed. To secure early mention, copies of papers or reprints should be sent to American Journal of Ophthalmology, 217 Imperial Building, Denver, Colorado.

### BOOKS.

- Addario La Ferla, G.** *Ottalmia simpatica*. 261 pages, 22 illustrations, 6 microphotographs, 752 references. Catania (Officina Grafica Badoniana). Clin. Opht., 1924, v. 28, p. 490.
- Behr, C.** *Die Lehre von den Pupillenbewegungen*. 236 pages, 34 illustrations, Berlin, J. Springer. 1924. A. J. O., 1924, v. 7, p. 727.
- Brückner, A.** *Basis of art of spectacle making for oculists*. 159 pages, 85 illustrations, J. Springer, 1924, Berlin. Reprint.
- Fuchs, A.** *Atlas of histopathology of the eye*. 191 illustrations, 44 color plates. English translation. Franz Deuticke, Leipzig and Vienna. A. J. O., 1924, v. 7, p. 727.
- Jahresbericht über die gesamte Ophthalmologie, 1921. 540 pages, Berlin, J. Springer, 1924. A. J. O., 1924, v. 7, p. 728.**
- Laignel-Lavastine, M.** *Pathologie du sympathique*. Félix Alcan, Paris, 1924, Arch. d'Opht., 1924, v. 41, p. 508.
- Romains, J.** *Eyeless sight*. Translated by C. K. Ogden. 262 pages. New York, G. P. Putnam's Sons. A. J. O., 1924, v. 7, p. 729.
- Sluder, G.** *Tonsillectomy*. 176 pages, 90 illustrations. C. V. Mosby Co., St. Louis, 1923. A. J. O., 1924, v. 7, p. 728.

### DIAGNOSIS.

- Bailliant and Nunes.** *Tonometry*. Bull. Soc. d'Opht. de Paris, 1924, April, pp. 187-194.
- Birkhäuser.** *Test of vision*. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 808.
- Blaskovics, L. de.** *New unit of visual acuity and its practical use*. (5 charts, bibl.) Arch. of Opht., 1924, v. 53, pp. 476-485.
- Butler, H.** *Microscopy of living eye*. Brit. Med. Assn., Sec. on Opht., 1924, July. Lancet, 1924, Aug. 9, p. 295.
- Practical value of slit lamp*. Proc. Royal Soc. Med., Sec. on Opht., 1924, v. 17, pp. 31-35.
- Evans, J. N.** *Campimeter recording and plotting chart*. (4 ill., 1 table) A. J. O., 1924, v. 7, pp. 691-696.
- Graves, B.** *Microscopy of living eye*. Brit. Med. Assn., Sec. on Opht., 1924, July. Lancet, 1924, Aug. 9, p. 295.
- Hertel.** *Perimetry and perimetry*. Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 751.
- Juler, F.** *Modification of Elliot's scotometer*. Royal Soc. Med., Sec. on Opht., 1924, June. A. J. O., 1924, v. 7, p. 706.

- Kahn, R. H. and Löwenstein, A.** *Electroretinogram*. (1 pl., 13 ill., 2 tables) Graefe's Arch. f. Opht., 1924, v. 114, pp. 304-331.
- Kestenbaum.** *Perimetry*. Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 751.
- King, C.** *Gullstrand lamp in clinical practice*. Ohio State Med. Jour., 1924, v. 20, pp. 508-514.
- Koby, F. E.** *Catoptric images and mirror zones in microscopy of living eye*. (4 ill.) Rev. Gén. d'Opht., 1923, v. 37, pp. 507-515.
- Anesthetic appropriate for tonometry*. Bull. Soc. d'Opht. de Paris, 1924, April, pp. 197-201.
- Diocain, new ocular anesthetic especially in tonometry*. Clin. Opht., 1924, v. 28, pp. 433-438.
- Rasvan and Stroesco.** *Intravital coloration of ocular membranes viewed by slit lamp*. Abst. Ann. d'Ocul., 1924, v. 161, p. 550.
- Salzer.** *Bjerrum's method of testing visual acuity*. Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., v. 72, pp. 752-754.
- Repeated titles*. **Horvath.** (A. J. O., 1924, v. 7, p. 737) Intern. Sur. Opht., 1924, v. 7, p. 305 and v. 8, p. 55.

### THERAPEUTICS.

- Avalos.** *Milk injections in ocular therapeutics*. Rev. Vallisolet de Especialidades, 1924, v. 10, pp. 110-120.
- Castellana, S.** *Action of viscum album on rabbit eye*. Gior. di Ocul., 1924, v. 5, p. 69. Abst. Intern. Sur. Opht., 1924, v. 8, p. 5.
- Clausen.** *Rivanol therapy*. Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 793.
- Cusi, R.** *Modern antiseptics*. Arch. de Oft. Hisp.-Amer., 1924, v. 24, pp. 404-409.
- Denti, A. V.** *Milk therapy in ophthalmology*. Boll. d'Ottal., 1923, p. 85. Abst. Rev. Gén. d'Opht., 1924, v. 38, p. 113.
- Fleischer.** *Results of tuberculin protein therapy*. (dis.) Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 785.
- Grafe.** *Insulin therapy for diabetes in ophthalmology*. (dis.) Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 754.
- Karelius, K.** *Negative pressure in ocular therapeutics*. Klin. Oczna, 1923, No. 3. Abst. Rev. Gén. d'Opht., 1924, v. 38, p. 111.

- Lindenmeyer.** Ion therapy. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 804.
- Ludloff, C.** Resistance of animals' eyes against pancreas enzymes. *Graefe's Arch. f. Ophth.*, 1924, v. 114, pp. 380-387.
- Magitot, A.** Adrenalin as mydriatic. *Bull. Soc. d'Opht. de Paris*, 1924, March, pp. 118-122.
- Meisner.** Effect of radium on rabbit's eyes. *Gesells. in Heidelberg*, 1924, June. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 784.
- Nakayama, S.** Entrance of adrenalin applied externally to eye into body. *Japan Med. World*, 1924, v. 4, p. 214.
- Schneider.** Isotonic collyria. *Gesells. in Heidelberg*, 1924, June. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 794.
- Vejdovsky, V.** Reargon in treatment of eye diseases. *Cas. Lek. Cesk.*, 1924, v. 63, p. 885. *Abst. Intern. Sur. Ophth.*, 1924, v. 8, p. 62.
- Wojno, S.** Protein therapy in diseases of eyes. *Klin. Oczna*, 1923, Nos. 3 and 4. *Abst. Rev. Gén. d'Opht.*, 1924, v. 38, p. 113.
- Repeated titles. **Ditroi.** (*A. J. O.*, 1924, v. 7, p. 414) *Brit. Jour. Ophth.*, 1924, v. 8, p. 436. **Huber.** (*A. J. O.*, 1924, v. 7, p. 737) *Intern. Sur. Ophth.*, 1924, v. 8, p. 62.

#### OPERATIONS.

- Vajda.** Iris forceps for iridectomy. (*dis.*) *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 814.
- Wülflin.** Stereo effect of color brightness. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 810.
- Repeated titles. **Sondermann.** (*A. J. O.*, 1924, v. 7, p. 738) *Intern. Sur. Ophth.*, 1924, v. 7, p. 309. **Stanka.** (*A. J. O.*, 1924, v. 7, p. 738) *Intern. Sur. Ophth.*, 1924, v. 8, p. 60.

#### PHYSIOLOGIC OPTICS.

- Beyne, J. and Worms, G.** Nocturnal visual acuity in man. *Comp. Rend. de la Soc. de Biol.*, 1924, v. 91, p. 178.
- Detwiler, S. R.** Visual cells in amblyostoma larvae revealed by responses to light. *Jour. Comp. Neurol.*, 1924, v. 36, p. 113. *Abst. Arch. of Neurol. and Psychiat.*, 1924, v. 12, p. 331.
- Dietzel, H.** Median optic localization. *Zeit. f. Biol.*, 1924, v. 80, pp. 289-316. *Abst. Zent. f. d. ges. Ophth. u. i. Grenz.*, 1924, v. 12, p. 472. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 547.
- Engelking, E. and Poos, F.** Stereophenomena in isochrome and heterochrome, comparison of light sense. *Graefe's Arch. f. Ophth.*, 1924, v. 114, pp. 340-379.
- Giessler, C. M.** Space sense phenomena. *Arch. f. d. ges. Psychol.*, 1923, v. 45, pp. 282-297. *Abst. Zent. f. d. ges. Ophth. u. i. Grenz.*, 1924, v. 12, p. 473.
- Goulden, C. B.** Reflections from various surfaces of eye. *Brit. Med. Assn., Sec. on Ophth.*, 1924, July. *Lancet*, 1924, Aug. 9, p. 296.

- Haas, E.** Fatigue in different regions of spectrum. *Bull. Soc. d'Opht. de Paris*, 1923, Dec., pp. 352-354.
- Hanriot.** Perception of distance and relief. *Lettura Oftal.*, 1924, Feb., p. 72.
- Lambolez, M.** Radius of curvature of dioptric surfaces of eyes. *Compt. Rend. des Seances de la Soc. de Biol.*, 1923, v. 89, p. 1227. *Abst. Zent. f. d. ges. Ophth. u. i. Grenz.*, 1924, v. 12, p. 440.
- Lumière, L.** Photographic representation of solid in space (photostereosynthesis). *Rev. d'Opt.*, 1923, No. 6, p. 229. *Abst. Rev. Gén. d'Opht.*, 1924, v. 38, p. 100.
- Marie, P., and Bouttier, H.** Eye movements and sense of space. *Schweiz. Arch. f. Neurol. u. Psych.*, 1923, v. 13, pp. 428-439. *Abst. Zent. f. d. ges. Ophth. u. i. Grenz.*, 1924, v. 12, p. 474.
- Passow.** Photodynamic phenomenon. (*dis.*) *Gesells. in Heidelberg*, 1924, June. *Klin. M. f. Augenh.*, 1924, v. 72, pp. 749-751.
- Rochon-Duvigneaud.** Center of retina. *Bull. Soc. d'Opht. de Paris*, 1924, April, p. 196.
- Tscherning.** Adaptation of eye. *Arch. de Oft. Hisp.-Amer.*, 1924, v. 24, p. 412.

#### REFRACTION.

- Brudzewski.** Optical effects of meniscus spectacles. *Klin. Oczna*, Nos. 3 and 4, 1923. *Abst. Rev. Gén. d'Opht.*, 1924, v. 38, p. 68.
- Erggelet, H.** Modern eye glasses. *Deut. med. Woch.*, 1924, v. 50, p. 980.
- Grafe.** New reading glass for weak sight. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 802.
- Haas, E.** Distance between correcting glasses. *Bull. Soc. d'Opht. de Paris*, 1924, Feb., pp. 77-81.
- Johnson, L.** Theory of accommodation. *Arch. of Ophth.*, 1924, v. 53, pp. 426-430.
- Landolt, M.** Equal ametropia in twins. *A. J. O.*, 1924, v. 7, p. 723.
- Lodoni, G.** Skiascopy in correction of astigmatism. *Lettura Oftal.*, 1924, Feb., pp. 59-66.
- Nochi, R.** Relation between position of eye and near point. *Japan Med. World*, 1924, v. 4, p. 214.
- Paton, D. D.** Eye headaches. *Med. Jour. Australia*, 1924, July 26, pp. 83-85.
- Schwenk, P. N. K.** Observations on refraction. *A. J. O.*, 1924, v. 7, pp. 689-691.
- Stoewer, P.** Ophthalmoplegic migraine. *Zeit. f. Augenh.*, 1924, v. 53, pp. 207-210.
- Terrien, F.** Headaches of ocular origin. *Presse Méd.*, 1924, Aug. 16, p. 1395.
- Vogt.** Spherical refraction. *Gesells. in Heidelberg*, 1924, June. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 757.
- Wätzold.** Refractive errors. *Gesells. in Heidelberg*, 1924, June. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, pp. 757-760.
- Whitehead, A. L.** Paresis of accommodation in encephalitis lethargica. *Brit. Med. Assn., Sec. on Ophth.*, 1924, July. *Lancet*, 1924, Aug. 9, p. 295.
- Young, H. B.** Dispensing of glasses. *J. A. M. A.*, 1924, v. 83, p. 633.

- Repeated titles. **Flieringa**. (A. J. O., 1924, v. 7, p. 738) Intern. Sur. Ophth., 1924, v. 8, p. 69. **Kleczkowski**. (A. J. O., 1924, v. 7, p. 569) Intern. Sur. Ophth., 1924, v. 8, p. 72. **Rosenstein**. (A. J. O., 1924, v. 7, p. 738) Intern. Sur. Ophth., 1924, v. 8, p. 71. **Vogt**. (A. J. O., 1924, v. 7, p. 738) Intern. Sur. Ophth., 1924, v. 8, p. 69.

## OCULAR MOVEMENTS.

- Argañaraz**, R. Ocular nystagmus. Las Ciencias, Buenos Aires, 1924, p. 306. Abst. Zent. f. d. ges. Ophth. u. i. Grenz., 1924, v. 12, pp. 403-406.
- Baldenweck**, L. Nystagmus provoked by head movements. Bull. Soc. d'Opht. de Paris, 1924, June, pp. 328-334.
- Barany**, R., **Vogt**, C., and **Vogt**, O. Cortical eye movements. (1 ill.) Jour. f. Psychol. u. Neurol., 1923, v. 30, pp. 87-121. Abst. Zent. f. d. ges. Ophth. u. i. Grenz., 1924, v. 12, p. 397.
- Bartels**. Nystagmus after severing optic nerve. Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 748.
- Blaskovics**. Double images. (dis.) Abst. Klin. M. f. Augenh., 1924, v. 72, p. 815.
- Blatt**, N. Disturbance of motility in anisometropia, amblyopia ex anopsia. Graefe's Arch. f. Ophth., 1924, v. 114, pp. 255-266.
- Bonner**, W. F. Relation of weakness of extraocular muscles and depth perception. A. J. O., 1924, v. 7, p. 699.
- Chambers**, E. R. Paralysis of divergence in encephalitis lethargica. Brit. Jour. Ophth., 1924, v. 8, pp. 417-418.
- Dide**, M. Pathogenesis of paralysis of ocular reflexes. (5 ills.) Arch. d'Opht., 1924, v. 41, pp. 497-500.
- Dufour**, M. Role of vergence in dioptrics. (23 figs.) Ann. d'Ocul., 1924, v. 161, pp. 578-603.
- Gallois**, J. Atypical zona ophthalmica with paralysis of third nerves. Ann. d'Ocul., 1924, v. 161, pp. 536-541.
- Holmes**, G. Paresis of internal recti in lateral movements of eyes. Proc. Royal Soc. Med., Sec. on Ophth., 1924, v. 17, p. 45.
- Hess**, W. R. Graphic method for examination of ocular motility. (5 charts) Rev. Gén. d'Opht., 1924, v. 38, pp. 5-20.
- Ide**, C. E. Occupational abducens paresis. A. J. O., 1924, v. 7, p. 704.
- Koellner**, H. Nystagmus in paresis of cranial nerves a focal symptom. Arch. f. Augenh., 1924, v. 94, p. 167. Abst. Intern. Sur. Ophth., 1924, v. 8, p. 76.
- Lenz**. Nuclear ocular motor apparatus. (dis.) Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, pp. 769-771.
- Leser**, O. Development of inferior oblique muscle. Cas. lek. Cesk., 1924, v. 63, p. 1034. Abst. J. A. M. A., 1924, v. 83, p. 654.
- Liebermann**. Meller's muscle suture. (dis.) Abst. Klin. M. f. Augenh., 1924, v. 72, p. 813.
- Meisner**. Strabismus. Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 765.
- Ocular palsies in encephalitis lethargica. Brit. Jour. Ophth., 1924, v. 8, p. 421.
- Odoul**, A. Apparatus for cure of strabismus. Bull. Soc. d'Opht. de Paris, 1924, June, pp. 340-343.
- Ohm**, J. New instrument for recording horizontal nystagmus. Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 764.
- Rotary nystagmus in general disease. (24 ins. bibl.) Graefe's Arch. f. Ophth., 1924, v. 114, pp. 169-192.
- Ribas Valero**. Visual attention and regional visual neutralization. Abst. Clin. Opht., 1924, v. 28, p. 476.
- Risien-Russell**, J. S. and **Macbride**, H. J. Benedict's syndrome. Proc. Royal Soc. Med., Sec. on Ophth., 1924, v. 17, p. 48.
- Rivers**, W. C. Squint and left handedness. Lancet, 1924, Aug. 9, p. 300.
- Thielemann**, M. B. Experimental work with Bárány reaction. Zent. f. d. ges. Ophth. u. i. Grenz., 1924, v. 12, p. 407.
- Valude**, E., **Giro**, L., and **Schiff-Werthelmer**, S. Cure of bilateral ophthalmoplegia after puerperal fever. (1 ill.) Soc. d'Opht. de Paris, 1924, Jan., pp. 20-24. Ann. d'Ocul., 1924, v. 161, pp. 614-616.
- Wick**, W. Muscle disturbances and operation for squint. (3 ills.) Zeit. f. Augenh., 1924, v. 53, pp. 202-206.
- Young**, C. A. Etiology and treatment of squint. Virginia Med. Monthly, 1924, v. 51, pp. 292-294.
- Repeated titles. **Arkin**. (A. J. O., 1924, v. 7, p. 739) Intern. Sur. Ophth., 1924, v. 8, p. 76. **Blatt**. (A. J. O., 1924, v. 7, p. 739) Intern. Sur. Ophth., 1924, v. 8, p. 79. **Cords and Blank**. (A. J. O., 1924, v. 7, p. 739) Intern. Sur. Ophth., 1924, v. 8, p. 59. **Ohm**. (A. J. O., 1924, v. 7, p. 739) Intern. Sur. Ophth., 1924, v. 8, p. 75. **Peters**. (A. J. O., 1924, v. 7, p. 662) Intern. Sur. Ophth., 1924, v. 8, p. 77.

## CONJUNCTIVA.

- Allisson**, F. H. Gonococcal conjunctivitis in adult treated by heterobacteriotherapy. Rev. Gén. d'Opht., 1923, v. 37, pp. 516-520.
- Berge**, E. Follicular conjunctivitis of dogs. Abst. Zent. f. d. ges. Ophth. u. i. Grenz., 1924, v. 12, p. 453.
- Bartolotta**, E. Pneumococcal conjunctivitis. Abst. Zent. f. d. ges. Ophth. u. i. Grenz., 1924, v. 12, p. 449.
- Bidault**, R. Statistics of trachoma and acute conjunctivitis in infants in Sahara. Rev. du Trachome, 1924, April, pp. 66-69.
- Bruckner**, Z. Permeability of conjunctiva for tubercle bacilli. Cas. lek. Cesk., 1924, v. 63, p. 1053. Abst. J. A. M. A., 1924, v. 83, p. 654.
- Bussy**. Chemical conjunctivitis from argyrol. Abst. Clin. Opht., 1924, v. 28, p. 488.

- Chaillous, J. Conjunctival tuberculosis and lupus of cheek. *Bull. Soc. d'Opht. de Paris*, 1924, Jan., pp. 27-29.
- Sporotrichosis and conjunctival tuberculosis. *Bull. Soc. d'Opht. de Paris*, 1924, Feb., p. 66 and March, p. 106.
- Demaria, E. B., Noceti, A., Wernicke, O., Ferro, P. B., and Barbieri, A. Trachoma in Argentina. *Semana Med.*, 1924, v. 31, pp. 303-313.
- Donnell, N. R. Treatment of trachoma with strong solutions of silver nitrate. *Arch. of Ophth.*, 1924, v. 53, pp. 433-438.
- Dupuy-Dutemps. Marginal symblepharon with pseudocyst of upper cul de sac with lacrimal obstruction. (1 ill.) *Bull. Soc. d'Opht. de Paris*, 1924, Jan., pp. 44-46.
- Fischer and Pasch. "Genital trachoma" question. *Zent. f. Gynäk.*, 1924, v. 48, p. 1539.
- Horay. Alcohol-lactic acid treatment of trachoma. (dis.) *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 812.
- Ishidzu, K. Corneal lipid degeneration in trachoma. *Japan Med. World*, 1924, v. 4, p. 212.
- Ishiwara, N. Resistance of conjunctiva to ray of short wave lengths. *Abst. Japan Med. World*, 1924, v. 4, p. 211.
- Jourdain, M. Trachoma. Paris thesis, 1924. *Abst. Rev. du Trachome*, 1924, April, pp. 79-82.
- Knuesel, O. Vital staining of human eye. Lymph vessels and conjunctiva. (7 ills. bibl.) *Zeit. f. Augenh.*, 1924, v. 53, pp. 191-198.
- Lagrange, H. Ulcerous tuberculosis of palpebral conjunctiva. (2 ills.) *Bull. Soc. d'Opht. de Paris*, 1924, Jan., pp. 32-37 and 55.
- Larsson, S. W. Gonorrheal conjunctivitis. *Svenska Läkartidn.*, 1924, v. 21, pp. 97-101. *Abst. Zent. f. d. ges. Ophth. u. i. Grenz.*, 1924, v. 12, p. 451.
- Lindner, W. Treatment of conjunctivitis from distemper in dogs. *Zent. f. d. ges. Ophth. u. i. Grenz.*, 1924, v. 12, p. 385.
- McMullen, J. Trachoma. *Southwestern Med.*, 1924, v. 8, pp. 425-428.
- Marquez and Soria. Geographic distribution of trachoma in Spain. *Rev. du Trachome*, 1924, April, pp. 56-58.
- Morax, V. Pneumococcal conjunctivitis. (2 ills.) *Bull. Soc. d'Opht. de Paris*, 1924, June, pp. 321-323.
- Difficulties in diagnosis of trachoma. (3 col. pl.) *Rev. du Trachome*, 1924, April, pp. 44-48.
- Morelli, E. Trachoma in Pisa in 1900-1922. *Boll. d'Ocul.*, 1924, v. 3, pp. 45-64. *Abst. Zent. f. d. ges. Ophth. u. i. Grenz.*, 1924, v. 12, p. 483.
- Migliorino, S. Treatment of neoplastic tuberculosis of bulbar conjunctiva by roentgenotherapy. *Boll. d'Ocul.*, 1924, May. *Abst. Clin. Opht.*, 1924, v. 28, p. 476.
- Nicolle, C. Acute conjunctivitis and Weeks' bacillus. *Rev. du Trachome*, 1924, April, pp. 41-44.
- Nigati. Cure of granular ophthalmia by sterilizing injections and apparent specific action of sulphate of copper. *Bull. de l'Acad. de Méd.*, 1924, v. 91, pp. 62-64. *Abst. Zent. f. d. ges. Ophth. u. i. Grenz.*, 1924, v. 12, p. 450.
- Onfray, R., Duclos and Gagey. Radium treatment of vernal conjunctivitis. (3 ills.) *Soc. d'Opht. de Paris*, 1924, Jan., pp. 6-20.
- Rothan. Diseases of conjunctiva. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 801.
- Schousboe. Contagion of trachoma in adult and infant. *Rev. du Trachome*, 1924, April, pp. 58-66.
- Schweig, S. J. Bilateral conjunctivoscleral syphilis. *Polska Gaz. Lek.*, 1924, v. 3, p. 297. *Abst. Intern. Sur. Ophth.*, 1924, v. 8, p. 87.
- Stanka. Sterilization of conjunctival sac. *Abst. Zent. f. d. ges. Ophth. u. i. Grenz.*, 1924, v. 12, p. 449.
- Stella Gangi, P. Serologic studies on trachoma. *Arch. di Ottal.*, 1924, v. 31, p. 168. *Abst. Intern. Sur. Ophth.*, 1924, v. 8, p. 86.
- Strozier. Folliculosis. *A. J. O.*, 1924, v. 7, p. 711.
- Talbot, R. Prophylaxis of trachoma in Annam. *Rev. du Trachome*, 1924, April, p. 48-56.
- Urbanek. Radium treatment of granular catarrh. *Zeit. f. Augenh.*, 1924, v. 53, p. 270.
- Waldeck, E. A. Parinaud's infectious conjunctivitis. *J. A. M. A.*, 1924, v. 83, pp. 765-766.
- Wissmann. Streptococci infection of conjunctival sac. (dis.) *Gesells. in Heidelberg*, 1924, June. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 787.
- Yudkin, A. M. Ophthalmia in rats on rations deficient in vitamin A. (bibl.) *Arch. of Ophth.*, 1924, v. 53, pp. 416-425.
- Repeated titles. Blessig and Kurika. (*A. J. O.*, 1924, v. 7, p. 662) *Intern. Sur. Ophth.*, 1924, v. 8, p. 86. Knüsel. (*A. J. O.*, 1924, v. 7, p. 739) *Intern. Sur. Ophth.*, 1924, v. 8, p. 53. Kumer and Sallmann. (*A. J. O.*, 1924, v. 7, p. 739) *Intern. Sur. Ophth.*, 1924, v. 8, p. 87. Schultz. (*A. J. O.*, 1924, v. 7, p. 740) *Intern. Sur. Ophth.*, 1924, v. 8, p. 88.

## CORNEA AND SCLERA.

- Alajmo, B. Parenchymatous keratitis nephritis. *Boll. d'Ocul.*, 1923, p. 32. *Abst. Rev. Gén. d' Opht.*, 1924, v. 38, p. 73.
- Birch-Hirschfeld. Diseases of cornea. *Gesells. in Heidelberg*, 1924, June. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 783.
- Treatment of infectious diseases of cornea with ultraviolet light. *Zeit. f. Augenh.*, 1924, v. 53, pp. 151-156.
- Chou, C. H. Tuberculosis of cornea-sclera. (5 figs. bibl.) *A. J. O.*, 1924, v. 7, p. 670.
- Blatt, N. Digestion therapy in corneal cicatrix. (1 table) *Ophth. Ges. in Wien*, 1921, pp. 338-350.
- Goar, E. L. Recurrent ulcerative keratitis. *A. J. O.*, 1924, v. 7, p. 710.

- Grüter.** Impetigo complicated with keratitis. (dis.) Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 789.
- Harada, N.** Family corneal degeneration. Japan Med. World, 1924, v. 4, p. 211.
- Jess.** Histology of copper pigment in cornea. Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 792.
- Kreidlová, A.** Congenital opacity of cornea. Cas. Lek. Cesk., 1924, v. 63, p. 1070.
- Lacroix, A.** Injections of milk in scrofulous keratoconjunctivitis. Bull. Soc. d'Opht. de Paris, 1923, Dec., pp. 380-384.
- Löhlein.** Inflammation of cornea. (dis.) Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 791.
- Narayan Rao, B. K.** Hemianesthesia of face with ulcer of cornea. Indian Med. Gaz., 1924, v. 59, p. 409.
- Popovici.** Parenchymatous keratitis cured by milk injections. Abst. Ann. d'Ocul., 1924, v. 161, p. 551.
- Sácha, A.** Optic phenomena relative to blebs of cornea. (3 ills.) Arch. d'Opht., 1924, v. 41, pp. 491-496.
- Schöninger.** Interstitial keratitis with acquired lues and idiosyncrasy against neosalvarsan. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 798.
- Sedan, J.** Ulcerous keratitis cured by auto-hemotherapy. Bull. Soc. d'Opht. de Paris, 1924, June, pp. 336-340.
- Seefelder.** Congenital staphyloma. Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 795.
- Suganuma, S.** Pathologic anatomy of primary tuberculous sclerokeratitis (3 col. ills., 6 figs., bibl.) Graefe's Arch. f. Ophth., 1924, v. 114, pp. 332-339.
- Thiel.** Degeneration of cornea. Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 765.
- Versé and Rohrschneider.** Origin of arcus lipoides in cornea, experimental in man and animals. Klin. Woch., 1924, v. 3, p. 1528.
- Weve.** Parenchymatous keratitis with lues. Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 767.
- Yamada, K.** Experimental corneal herpes. Japan Med. World, 1924, v. 4, p. 213.
- Repeated title. **Blatt.** (A. J. O., 1924, v. 7, p. 740) Intern. Sur. Ophth., 1924, v. 8, p. 89.
- ANTERIOR CHAMBER AND PUPIL.**
- Bujadoux and Kofman.** Pupillary reflexometry. Abst. Ann. d'Ocul., 1924, v. 161, p. 548.
- Carusi, R.** Induced anisocoria in tuberculosis. Policlinico, 1924, v. 31, p. 933. Abst. J. A. M. A., 1924, v. 83, p. 649.
- Derkac, V.** Cholesterol crystals in anterior chamber. Zent. f. d. ges. Ophth. u. i. Grenz., 1924, v. 12, p. 485.
- Duverger and Redslob.** Pathogenesis of Argyll Robertson sign. Strasbourg, 1923, Abst. Clin. Opht., 1924, v. 28, p. 465.
- Kastan, M.** Disturbance of pupil in lues. Med. Klin., 1924, v. 20, p. 992.
- Lawrentjew, N.** Pupil in Parkinson's disease after encephalitis. Zent. f. d. ges. Ophth. u. i. Grenz., 1924, v. 12, p. 481.
- Ohkuni, J.** Influence of hypodermic injection of insulin on sugar contents of aqueous humor. Central Med. Jour. (Japan), 1924, v. 43, No. 9. Abst. Japan Med. World, 1924, v. 4, p. 202.
- Sergeant, E.** Inequality of pupils in pulmonary tuberculosis. Jour. des Practiciens, 1924, v. 38, p. 8. Abst. Zent. f. d. ges. Ophth. u. i. Grenz., 1924, v. 12, p. 482.
- Weekers, L.** Experiments of Ehrlich in man. (bibl.) Arch. d'Opht., 1924, v. 41, pp. 409-419.
- Yata, S.** Action of drugs on pupil of extirpated frog's eye. Japan Med. World, 1924, v. 4, p. 207.
- UVEAL TRACT.**
- Bryn, H.** Inheritance of eye color in man. Hereditas, 1920, p. 186. Abst. Rev. Gén. d'Opht., 1924, v. 38, p. 97.
- Daily, R. K.** Syphilitic chorioretinitis. A. J. O., 1924, v. 7, p. 710.
- Fede, di N.** Blennorrhagic iritis. Morgagni, 1924. Lettura Oft., 1924, Feb., p. 98.
- Hepburn, M. L.** Classification of diseases of choroid. (4 ills.) Brit. Jour. Ophth., 1924, v. 8, pp. 401-409.
- Hessberg.** Chronic iridocyclitis. Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 784.
- Hollmann, G. F.** Changes in choroidal vessels in malaria. Zent. f. d. ges. Ophth. u. i. Grenz., 1924, v. 12, p. 486.
- Howell, C. M. H., and Carmichael, E. A.** Gumma of choroid. Proc. Royal Soc. Med., Sec. on Ophth., 1924, v. 17, p. 48.
- Janku, J.** Heterochromia of iris. Cas. Lek. Cesk., 1924, v. 63, p. 1043. Abst. J. A. M. A., 1924, v. 83, p. 654.
- Lagrange, F.** Afollicular, tuberculous chorioretinitis. (12 ills.) Arch. d'Opht., 1924, v. 41, pp. 385-408. Bull. Soc. d'Opht. de Paris, 1924, Feb., pp. 83-98.
- Morgan, O. G.** Observation with slit lamp in cyclitis. Brit. Med. Assn., Sec. on Ophth., 1924, July. Lancet, 1924, Aug. 9, p. 296.
- Mukerji, S. K.** Suppurative metastatic chorioiditis after cholera. Calcutta Med. Jour., 1924, v. 19, pp. 708-710.
- Perrin.** Paracentesis of anterior chamber in chronic iridochoroiditis. Congress de la Soc. franc. d'Opht., 1924, May. Arch. d'Opht., 1924, v. 41, p. 441. Ann. d'Ocul., 1924, v. 161, p. 465.
- Rollet, Werdlamer and Colrat.** Plastic iritis following acute appendicitis. Abst. Ann. d'Ocul., 1924, v. 161, p. 545.
- Seidel.** Circulation of blood in choroid. Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 760.
- Worms, G., and Pesme, J.** Iridocyclitis of intestinal origin. Bull. Soc. d'Opht. de Paris, 1924, March, pp. 137-150.

## SYMPATHETIC DISEASE.

- Herbert, H.** Late sympathetic ophthalmia. *Proc. Royal Soc. Med., Sec. on Ophth.*, 1924, v. 17, pp. 27-31.
- Szily.** Sympathetic ophthalmia and pathogenesis of herpes cornea. (dis.) *Gesells. in Heidelberg*, 1924, June. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 756.
- Tooker, C. W., and Lamb, H. D.** Iridocyclitis sympathica following iridectomy for glaucoma secondary to sarcoma of choroid. (1 pl. bibl.) *Arch. of Ophth.*, 1924, v. 53, p. 439-453.

## GLAUCOMA.

- Andrade, G. de.** Glaucoma after discission for cataract. *Brazil Med.*, 1924, v. 38, p. 53, 72 and 97.
- Arnoux, M.** Glaucoma with syphilis. *Clin. Opht.*, 1924, v. 28, pp. 440-451.
- Baurmann.** Glaucoma. *Gesells. in Heidelberg*, 1924, June. *Klin. M. f. Augenh.*, 1924, v. 72, p. 771.
- Cantonnet.** Family glaucoma. *Bull. Soc. d'Opht. de Paris*, 1924, Feb., p. 83.
- Eliasberg, M.** Simultaneous glaucoma and senile cataract operations in pronounced myopia. *Polska Gaz. Lek.*, 1924, v. 3, p. 242. *Abst. Intern. Sur. Opht.*, 1924, v. 8, p. 71.
- Elschnig, A.** Operative treatment of glaucoma. (3 ills.) *Zent. f. d. ges. Opht. u. i. Grenz.*, 1924, v. 12, pp. 353-360.
- Gjessing, H. G. A.** Filtration scar after Holth's iridencleisis. *Norsk. Mag. f. Laegevid.*, 1923, v. 84, pp. 1039-1046. *Abst. Zent. f. d. ges. Opht. u. i. Grenz.*, 1924, v. 12, p. 461.
- Jonin, J.** Chronic glaucoma. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 805.
- Grosz.** Indication for cyclodialysis. *Gesells. in Heidelberg*, 1924, June. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 779.
- Hamburger.** Glaucoma. (dis.) *Gesells. in Heidelberg*, 1924, June. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, pp. 774-777.
- Hiroishi, H.** Ophthalmic pressure and blood pressure of upper scleral veins and vena vorticiosa. *Japan Med. World*, 1924, v. 4, p. 214.
- Holland, H. T.** Hereditary glaucoma affecting three generations. *Indian Med. Gaz.*, 1924, v. 59, p. 408.
- Kadlický, R.** Treatment of glaucoma. *Cas. Lek. Cesk.*, 1924, v. 63, p. 1035. *Abst. J. A. M. A.*, 1924, v. 83, p. 654.
- Kipshagen, F.** Hydrophthalmus in chicken and cat. *Abst. Zent. f. d. ges. Opht. u. i. Grenz.*, 1924, v. 12, p. 445.
- Moore, G. A.** Observations on glaucoma. *Boston Med. and Surg. Jour.*, 1924, v. 191, pp. 476-484.
- Pesme, P.** Corneal microscope study of glaucomatous iris. (1 ill.) *Arch. d'Opht.*, 1924, v. 41, pp. 429-434.
- Preziosi, C. L.** Electrocautery in treatment of glaucoma. *Brit. Jour. Opht.*, 1924, v. 8, pp. 414-417.
- Prieur.** Monocular hemorrhagic glaucoma cured by iridectomy. *Bull. Soc. d'Opht. de Paris*, 1924, June, pp. 334-336.

- Samojloff, A. J.** Scotometry of hypertension of eye. (4 ills., 3 tables, bibl.) *Ann. d'Ocul.*, 1924, v. 161, pp. 523-536.
- Sanderson, D. D.** Adolescence glaucoma. *Nebraska State Med. Jour.*, 1924, v. 8, p. 322-324.
- Seidel, E.** Physiologic fluid changes in eye. *Gesells. in Heidelberg*, 1924, June. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 762.
- Serr, H.** Condition of blood and glaucoma. (9 ills.) *Graefe's Arch. f. Opht.*, 1924, v. 114, pp. 393-440.
- Smith, D. V.** Causes and symptoms of glaucoma. *China Med. Jour.*, 1924, v. 38, p. 533.
- Thiel.** Intraocular tension. *Gesells. in Heidelberg*, 1924, June. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, pp. 772-774.
- Voiculesco.** Cyclodialysis of Heine in glaucoma. *Abst. Ann. d'Ocul.*, 1924, v. 161, p. 550.
- Weiss, O.** Pressure in ocular veins. *Pflüger's Arch. f. d. ges. Physiol.*, 1924, v. 202, pp. 642-644. *Abst. Zent. f. d. ges. Opht. u. i. Grenz.*, 1924, v. 12, p. 472.
- Repeated titles. **Carliotti.** (*A. J. O.*, 1923, v. 7, p. 875) *Brit. Jour. Opht.*, 1924, v. 8, p. 432. **Samojloff.** (*A. J. O.*, 1923, v. 6, p. 875) *A. J. O.*, 1924, v. 7, p. 731.

## CRYSTALLINE LENS.

- Ahlgreen, G.** Crystalline lens metabolism. *Skand. Arch. f. Physiol.*, 1923, v. 54, p. 196. *Abst. Rev. Gén. d'Opht.*, 1924, v. 38, p. 99.
- Axenfeld.** Cataract extraction after iridocyclitis. *Gesells. in Heidelberg*, 1924, June. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, pp. 777-779.
- Bardelli, L.** Cataract operation in patient aged 101. *Boll. d'Of.*, 1924. *Abst. Clin. Opht.*, 1924, v. 28, p. 467.
- Operation of cataract. *Boll. d'Ocul.*, 1924, v. 3, pp. 65-74. *Abst. Zent. f. d. ges. Opht. u. i. Grenz.*, 1924, v. 12, p. 416.
- Barraquer.** Intracapsular method of cataract extraction. *Brit. Med. Assn., Sec. on Opht.*, 1924, July. *Lancet*, 1924, Aug. 9, p. 293.
- Bussy.** Spontaneous cure of secondary cataract. *Abst. Clin. Opht.*, 1924, v. 28, p. 487.
- Cayce, E. B.** Traumatic cataract. *A. J. O.*, 1924, v. 7, p. 719.
- Elschnig.** Intracapsular extraction of senile cataracts. *Gesells. in Heidelberg*, 1924, June. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 779.
- Gála, A.** Orbicular phenomenon of lens. *Cas. Lek. Cesk.*, 1924, v. 63, p. 1066. *Abst. J. A. M. A.*, 1924, v. 83, p. 654.
- Gifford, S. R.** Congenital anomalies of lens as seen with slit lamp. (7 figs. bibl.) *A. J. O.*, 1924, v. 7, pp. 678-685.
- Goldschmidt.** Senile changes in eye. *Gesells. in Heidelberg*, 1924, June. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 777.
- Guiral y Viñoli, R.** Faccoerisis of Barraquer. *Rev. de Med. y Cir. de la Habana*, 1924, v. 29, pp. 111-125.
- Horvath.** Vossius' ring opacities. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 814.

- Jackson, E.** Optical helps for partial cataract. *A. J. O.*, 1924, v. 7, p. 724.
- Jones, A. C., and Clark, C. P.** Mesentery thrombosis and death following cataract extraction. *A. J. O.*, 1924, v. 7, p. 704.
- Kranz.** Cataract with heterochromia. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 804.
- Kurz, J.** Cataract in eczema. *Cas. Lek. Cesk.*, 1924, v. 63, p. 1072. *Abst. J. A. M. A.*, 1924, v. 63, p. 654.
- Lang, B.** Needling lens capsule in cataract extraction. *Proc. Royal Soc. Med., Sec. on Ophth.*, 1924, v. 17, p. 36.
- Extraction of senile cataract.** *Proc. Royal Soc. Med., Sec. on Ophth.*, 1924, v. 17, p. 35.
- Lenhard, O.** Influence of serum toxin on crystalline lens. (4 ills. bibl.) *Graefe's Arch. f. Ophth.*, 1924, v. 114, pp. 235-254.
- Lloyd, R. I.** Infection after needling. *Arch. of Ophth.*, 1924, v. 53, pp. 431-432.
- Metzger.** Morgagnian cataract. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 801.
- Narayan Rao, B. K.** Transient exophthalmos during cataract operation. *Indian Med. Gaz.*, 1924, v. 59, p. 409.
- Neame, H.** Posterior stellate cataract following trauma. *Brit. Med. Assn., Sec. on Ophth.*, 1924. *Lancet*, 1924, Aug. 9, p. 296.
- Rochon-Duvigneaud, A.** Large cystectomy in cataract operation. (5 ills.) *Ann. d'Ocul.*, 1924, v. 161, pp. 484-490.
- Salzer.** Cortical cataract. *Gesells. in Heidelberg*, 1924, June. *Klin. M. f. Augenh.*, 1924, v. 72, p. 764.
- Sinclair, A. H. H.** Forceps for intracapsular extraction of cataract. (dis.) *Brit. Med. Assn., Sec. on Ophth.*, 1924, July. *Lancet*, 1924, Aug. 9, pp. 293-295.
- Slavik, B.** Treatment of secondary cataract. *Cas. Lek. Cesk.*, 1924, v. 63, p. 1041. *Abst. J. A. M. A.*, 1924, v. 83, p. 654.
- Somogyi.** Subconjunctival lens luxation. (dis.) *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 812.
- Spasski, S. S.** Intracapsular cataract extraction. *Zent. f. d. ges. Ophth. u. i. Grenz.*, 1924, v. 12, p. 417.
- Stanka.** Corneal complications following senile cataract extraction. (dis.) *Gesells. in Heidelberg*, 1924, June. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, pp. 780-783.
- Unthoff.** Treatment of cataract. *Deut. med. Woch.*, 1924, v. 50, pp. 978-980. *Abst. J. A. M. A.*, 1924, v. 83, p. 723.
- Vasek, E.** Fistula operation for unripe cataract. *Cas. Lek. Cesk.*, 1924, v. 63, p. 1087.
- Zentmayer, W.** Pathogenesis of Vossius ring cataract. *A. J. O.*, 1924, v. 7, p. 676.
- THE VITREOUS HUMOR.**
- Baurmann, M.** Properties of vitreous in animals. Blood serum and intraocular fluids. *Graefe's Arch. f. Ophth.*, 1924, v. 114, pp. 276-303.
- Meesmann.** Blood, vitreous and cerebrospinal fluid. *Gesells. in Heidelberg*, 1924, June. *Klin. M. f. Augenh.*, 1924, v. 72, p. 761.
- Narayan Rao, B. K.** Synchysis scintillans. *Indian Med. Gaz.*, 1924, v. 59, p. 410.
- Robinson, F. H.** Opacities in vitreous. *South African Med. Rec.*, 1924, v. 22, p. 286.
- Saska, J.** Hemorrhages in vitreous body. *Cas. Lek. Cesk.*, 1924, v. 63, p. 1085.
- THE RETINA.**
- Amberson, W. R.** Secondary excitation in retina. *Amer. Jour. of Physiol.*, 1924, v. 69, p. 354.
- Bailliant.** Intermittent blindness with vascular spasm. *Bull. Soc. d'Opht. de Paris*, 1924, April, pp. 154-159.
- Bettermieux.** Detachment of retina and nonperforating, pericorneal sclerectomy. *Rev. Gén. d'Opht.*, 1924, v. 38, pp. 90-92.
- Cayce, E. B.** Congenital band in fundus. *A. J. O.*, 1924, v. 7, p. 720.
- Comberg.** Origin of venous pulse. *Gesells. in Heidelberg*, 1924, June. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 763.
- Gasparini, G.** Injection of strychnin into Tenon's capsule in amblyopia of diabetes insipidus. *Arch. Ital. d'Oft.*, 1923, v. 3, p. 229. *Abst. Intern. Sur. Ophth.*, 1924, v. 8, p. 21.
- Griscom, J. M.** Von Hippel's disease. *A. J. O.*, 1924, v. 7, p. 713.
- Gros.** Eye disturbance following pregnancy. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 802.
- Guibert.** Detachment of retina and typhoid fever. *Soc. franc. d'Opht.*, 1924. *Clin. Opht.*, 1924, v. 28, pp. 438-440.
- Ito, S.** Experimental retinal tuberculosis. *Japan Med. World*, 1924, v. 4, p. 212.
- Jess.** Cyst of retina. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 800.
- Kraupa, E.** Morphology of eyeground. Opticociliary artery and opticociliary veins. (13 ills.) *Klin. M. f. Augenh.*, 1924, v. 72, pp. 724-740.
- Langdon, H. M.** Embolism of central artery of retina during chorea. *A. J. O.*, 1924, v. 7, pp. 715-716.
- Laws, W. G.** Retinochoroiditis possibly associated with pituitary dysfunction. (3 fields) *Brit. Jour. Ophth.*, 1924, v. 8, pp. 410-413.
- Merigot de Treigny.** Traumatic retinal angiopathy. *Bull. de la Soc. d'Opht. de Paris*, 1923, Dec., pp. 342-344.
- Misiewicz, J., and Frankowska, J.** Retinal hemorrhage as first sign of hemorrhagic diathesis. *Klin. Oczna*, 1923, No. 3. *Abst. Rev. Gén. d'Opht.*, 1924, v. 38, p. 106.
- Noble, W.** Peripheral spots in retina. *Proc. Royal Soc. of Med., Sec. on Ophth.*, 1924, June. *A. J. O.*, 1924, v. 7, p. 706.
- Ochi, T.** Biologic meaning of pigment in pigmented cells of retina. *Japan Med. World*, 1924, v. 4, p. 212.
- Paton, L.** Cerebromacular degeneration. *Proc. Royal Soc. Med., Sec. on Ophth.*, 1924, v. 17, p. 42.
- Scheerer.** Disturbances of retinal vessels. (dis.) *Gesells. in Heidelberg*, 1924, June. *Klin. M. f. Augenh.*, 1924, v. 72, p. 790.

- Sjaaff., and Zeeman, W. P. C.** Course of fibers in retina and optic nerve in rabbits. (23 ills.) *Graefe's Arch. f. Ophth.*, 1924, v. 114, pp. 192-211.
- Sourdille, G.** Detachment of retina. *Bull. de la Soc. d'Opht. de Paris*, 1924, pp. 311-320.
- Takahaski, T.** Relation between retinal pigment degeneration and function of liver. *Japan Med. World*, 1924, v. 4, p. 212.
- Valude, E., and Schiff-Wertheimer, S.** Recurring retinal hemorrhages in adolescence. *Bull. de la Soc. d'Opht. de Paris*, 1924, Jan., pp. 24-27.
- Vogt, A.** Congenital defects of macula. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 806.
- Repeated titles. **Brouwer.** (A. J. O., 1924, v. 7, p. 419) A. J. O., 1924, v. 7, p. 733.
- Dieter.** (A. J. O., 1924, v. 7, p. 572) *Intern. Sur. Ophth.*, 1924, v. 7, p. 286.

#### THE OPTIC NERVE.

- Abadie, C.** Optic atrophy with permanent vascular spasm. *Bull. de la Soc. d'Opht. de Paris*, 1924, April, pp. 159-162.
- Atrophy of optic nerve. *Bull. de la Soc. d'Opht. de Paris*, 1924, March, pp. 129-137.
- Baldenweck.** Optic neuritis cured by sinus operation. *Bull. Soc. d'Opht. de Paris*, 1924, Jan., p. 57.
- Bareé, J. A.** Sclerosis in plaques of labyrinthine forms. *Abst. Arch. d'Opht.*, 1924, v. 41, p. 446.
- Bergmeister, R.** Necrotic intraocular tuberculosis and tuberculosis of optic nerve. (2 ills.) *Zeit. f. Augenh.*, 1924, v. 53, pp. 175-191.
- Chaillous, J.** Cure of spontaneous, acute, retrobulbar neuritis. *Bull. Soc. d'Opht. de Paris*, 1924, Jan., pp. 37-44.
- Christiansen, V.** Diagnostic value of papillary stasis from neurologic point of view. (20 fields) *Arch. d'Opht.*, 1924, v. 41, pp. 467-490.
- Hippel.** Heterotropia; medullated nerve fibers. *Gesells. in Heidelberg*, 1924, June. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 767.
- Horniker.** X-ray in optic nerve disease. *Gesells. in Heidelberg*, 1924, June. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 766.
- Joltrois and Liebaut.** Acute retrobulbar neuritis with sphenoidal sinusitis. (3 ills.) *Bull. Soc. d'Opht. de Paris*, 1924, March, pp. 113-118. *Ann. d'Ocul.*, 1924, v. 161, p. 301.
- Lenoir and Beaujeu.** Acute retrobulbar optic neuritis. *Ann. d'Ocul.*, 1924, v. 161, pp. 502-507.
- Lodato, G.** Radiologic examination in optic atrophy due to compression. *Bull. d'Ocul.*, 1923, p. 7. *Abst. Rev. Gén. d'Opht.*, 1924, v. 38, p. 108.
- Oloff.** Choked disc and brain tumor. *Gesells. in Heidelberg*, 1924, June. *Klin. M. f. Augenh.*, 1924, v. 72, p. 793.

- Pesme, P.** Bilateral acute retrobulbar neuritis following suppurated ethmoid and sphenoid sinusitis. *Ann. d'Ocul.*, 1924, v. 161, pp. 507-511.
- Pillat.** Inflammation of optic nerve in lactation. *Zeit. f. Augenh.*, 1924, v. 53, pp. 268-270.
- Rivet and Jany.** Retrobulbar neuritis in multiple sclerosis. *Bull. Soc. Méd. des Hôp.*, 1924, v. 48, p. 1093. *Abst. J. A. M. A.*, 1924, v. 83, p. 795.
- Schlippe.** Retrobulbar optic neuritis with van der Hoeve symptom. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 800.
- Shigeta, T.** Experimental degeneration of optic nerve from suppurative encephalitis. *Japan Ophth. Soc.*, 1924, April. *Japan Med. World*, 1924, v. 4, p. 213.
- Syme, W. S.** Sphenoidal sinus in relation to optic nerve. *Jour. of Laryngol. and Otol.*, Edinburgh, 1924, v. 39, p. 375.
- Teyssieu, M. de and Pesme, P.** Retrobulbar neuritis from dental infection a beginning of multiple sclerosis. *Jour. de Méd. de Bordeaux*, 1924, v. 96, pp. 694-695.
- Torres Estrada.** Atrophy of optic nerve following typhus. *Rev. Vallisolet de Especialidades*, 1924, v. 10, pp. 124-128.
- Traquair, H. M.** Visual changes in optic nerve disease. *Jour. of Laryngol. and Otol.*, 1924, v. 39, p. 384.
- Wagener, H. P. and Keith, N. M.** Marked hypertension, adequate renal function and neuroretinitis. *Arch. of Intern. Med.*, 1924, v. 34, pp. 374-387.
- Worms, G., and Pesme, J.** Optic atrophy with encephalitis lethargica. *Bull. Soc. d'Opht. de Paris*, 1923, Dec., pp. 367-376.
- Wyllie, W. G.** Optic atrophy with osteitis deformans. *Proc. Royal Soc. Med., Sec. on Ophth.*, 1924, v. 17, p. 45.
- Young, G.** Retrobulbar neuritis of sphenoidal sinus origin. *Jour. of Laryngol. and Otol.*, Edinburgh, 1924, v. 39, p. 381.
- Repeated title. **Maggiore.** (A. J. O., 1924, v. 7, p. 254) A. J. O., 1924, v. 7, p. 735.

#### VISUAL TRACTS AND CENTERS.

- Bliedung, C.** Treatment of choked disc thru corpus callosum. *Zeit. f. Augenh.*, 1924, v. 53, pp. 199-202.
- Boegel, M.** Inferior hemianopsia. *Lettura Oft.*, 1924, Feb., p. 124.
- Cosmettatos, G. F.** Oxycephaly and atrophy of optic nerve. (1 ill. bibl.) *Rev. Gén. d'Opht.*, 1924, v. 38, pp. 79-85.
- Dabney, S. G.** Ocular symptoms of disturbed cerebral circulation. A. J. O., 1924, v. 7, pp. 685-688.
- Felicine-Gurwitsch, L.** Process of differentiation in field conception. *Abst. Zent. f. d. ges. Ophth. u. i. Grenz.*, 1924, v. 12, p. 469.
- Haitz.** Changes of macular representation from wounds in back of head. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 802.
- Igersheimer.** Visual tract in tabes and paralyisis. *Gesells. in Heidelberg*, 1924, June. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 769.

- Leblond, E.** Bilateral annular scotoma of traumatic origin. (1 ill.) Bull. Soc. d'Opht. de Paris, 1924, June, pp. 344-347.
- Leri, A.** Oxycephaly. Bull. Soc. d'Opht. de Paris, 1923, Dec., pp. 344-352.
- Lloyd, J. H., and Grant, F. C.** Tumor of hypophysis. (6 ills. dis.) Arch. of Neurol. and Psychiat., 1924, v. 12, pp. 277-287.
- Pfeifer.** Cortical segments in visual tract. Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 768.
- Riddoch, G., and Goulden, C.** Relations between subarachnoid and intraocular hemorrhage. Proc. Royal Soc. Med., Sec. on Ophth., 1924, June. A. J. O., 1924, v. 7, pp. 707-710.
- Worms, G.** Bitemporal hemianopsia following syphilitic osteoperiostitis. Bull. Soc. d'Opht. de Paris, 1923, Dec., pp. 376-379.
- Repeated titles. **Backhaus.** (A. J. O., 1923, v. 6, p. 627) A. J. O., 1924, v. 7, p. 731.
- Knapp.** (A. J. O., 1924, v. 7, p. 744) Intern. Sur. Ophth., 1924, v. 8, p. 71.
- Lo Russo.** (A. J. O., 1924, v. 7, p. 254) A. J. O., 1924, v. 7, p. 734.
- Schöninger.** (A. J. O., 1924, v. 7, p. 744) Intern. Sur. Ophth., 1924, v. 8, p. 71.
- Strebel.** (A. J. O., 1924, v. 7, p. 574) Intern. Sur. Ophth., 1924, v. 7, p. 232.

## COLOR VISION.

- Engelking.** Stereo- and time-difference value of colors in research of congenital color perception. Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 747.
- Haas, E.** Experimental mixing of colors. Bull. Soc. d'Opht. de Paris, 1924, Jan., pp. 53-55.
- Piéron, H.** Mechanism of appearance of subjective colors of Fechner-Benham. Année Psychol., 1923, v. 23, pp. 1-49. Abst. Zent. f. d. ges. Ophth. u. i. Grenz., 1924, v. 12, p. 437.
- Polack, A.** Chromatism of eye. Dispersion of light. (76 ills.) Bull. Soc. d'Opht. de Paris, 1923, Nov., pp. 402-560.
- Seeing and hearing colors. Jour de Méd. de Bordeaux, 1924, Aug. 10, p. 687.
- Stewart, G. N.** Color phenomena. Amer. Jour. of Physiol., 1924, v. 69, p. 337.
- Wölfflin.** Hypersensitiveness to colors. (dis.) Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 748.

## THE EYEBALL.

- Castaldi.** Cyclopia with diplophthalmus in human embryo. Boll. d'Ocul., v. 3, pp. 191-234. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 828.
- Chidester, F. E.** Origin of cycloplan monsters. Amer. Naturalist, 1923, v. 57, pp. 496-518.
- Gallemaerts.** Congenital family anophthalmos. (bibl.) Ann. d'Ocul., 1924, v. 161, pp. 490-496.
- Nochi, K.** Technic of insertion of artificial eye. Abst. Japan. Med. World, 1924, v. 4, p. 211.

- O'Brien, T. A.** Bilateral metastatic ophthalmitis. A. J. O., 1924, v. 7, p. 714.
- Pulliam, L.** Atrophied eyeball. A. J. O., 1924, v. 7, p. 711.
- Rochon-Duvigneaud, A.** Ocular transplantation. Bull. Soc. d'Opht. de Paris, 1924, June, pp. 323-328.
- Urbanek.** Spontaneous explosion of artificial eye. Zeit. f. Augenh., 1924, v. 53, p. 270.
- Van Duyse, D.** Morphology of cyclops. (2 ills. bibl.) Arch. d'Opht., 1924, v. 41, pp. 449-466.
- Repeated title. **Velhagen.** (A. J. O., 1924, v. 7, p. 745) Intern. Sur. Ophth., 1924, v. 8, p. 56.

## LACRIMAL APPARATUS.

- Balacco.** Suppuration of lacrimal sac following jequirity. Boll. d'Ocul., 1924, pp. 270-276. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 829.
- Campos, E.** Epiphora. Brazil Med., 1924, v. 38, p. 52.
- Catheterization of lacrimal canal. Brazil Med., 1924, v. 38, p. 71.
- Heimann, E. A.** Diseases of nasolacrimal duct. Deut. med. Woch., 1924, v. 50, p. 719. Abst. Intern. Sur. Ophth., 1924, v. 8, p. 84.
- Liégard.** Mycotic conjunctivitis of canaliculus. Bull. Soc. d'Opht. de Paris, 1923, Dec., pp. 339-342.
- Nida.** Syndrome of Mikulicz treated with radiotherapy. Bull. Soc. d'Opht. de Paris, 1923, Dec., p. 339 and 1924, Jan., p. 29.
- Nühsman.** Intranasal operations on lacrimal sac. Arch. f. Ohren-Nasen-u. Kehlophth., 1924, v. 111, p. 250. Abst. Intern. Sur. Ophth., 1924, v. 8, p. 83.
- Sattler.** Surgical treatment of lacrimal obstruction. Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 780.
- Repeated titles. **Bollack.** (A. J. O., 1924, v. 7, p. 666) Intern. Sur. Ophth., 1924, v. 8, p. 82.
- Isakowitz.** (A. J. O., 1924, v. 7, p. 745) Intern. Sur. Ophth., 1924, v. 8, p. 84.
- Reitsch.** (A. J. O., 1924, v. 7, p. 745) Intern. Sur. Ophth., 1924, v. 8, p. 85.
- Wiltchke.** (A. J. O., 1924, v. 7, p. 745) Intern. Sur. Ophth., 1924, v. 8, p. 84.

## DISEASES OF THE LIDS.

- Botteri.** Symblepharon of upper lid. Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 785.
- Davidson, W. C., and Green, C. H.** Xeroderma pigmentosum. (13 ills.) Johns Hopkins Hospital Bull., 1924, v. 35, pp. 285-294.
- Ellett, E. C.** Kuhnt-Szymanowski operation. A. J. O., 1924, v. 7, p. 637.
- Fox, N., and Machlis, S.** Primary syphilitic lesion of upper lid. A. J. O., 1924, v. 7, p. 701.
- Gernert, R. v.** Excision of tarsus. Zeit. f. Augenh., 1924, v. 53, pp. 211-214.

- Joseph, H.** Blepharoplasty. *Brun's Beitr. z. klin. Chir.*, 1924, v. 131, pp. 52-65. *Abst. Zent. f. d. ges. Ophth. u. i. Grenz.*, 1924, v. 12, p. 448.
- Kapuscinski.** Restitution of partial defect of lid. *Klin. Oczna*, No. 30, 1923. *Abst. Rev. Gén. d'Opht.*, 1924, v. 38, p. 70.
- Kreiker.** Endogenous tuberculosis of lids. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 814.
- Moravec, Z.** Elephantiasis of eyelids. *Cas. Lek. Cesk.*, 1924, v. 63, p. 1082. *Abst. J. A. M. A.*, 1924, v. 83, p. 654.
- Ombredanne, L.** Surgical correction of facial coloboma involving lower lid. *Rev. d'Orthop.*, 1924, v. 31, p. 315. *Abst. Intern. Sur. Ophth.*, 1924, v. 8, p. 61.
- Schreiber.** Restoration of eyelashes after lid diseases. *Gesells. in Heidelberg*, 1924, June. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 793.
- Schousboe.** Trachomatous trichiasis. (6 ills.) *Ann. d'Ocul.*, 1924, v. 83, pp. 512-523.
- Thies.** Conjunctival plastic operation following severe cauterization. *Gesells. in Heidelberg*, 1924, June. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 780.
- Valude and Gallois.** Atypical ophthalmic zona with double ptosis. *Bull. Soc. d'Opht. de Paris*, 1924, April, p. 207.
- Zentmayer, W.** Operative results in cicatricial ectropion. *A. J. O.*, 1924, v. 7, p. 711.
- Repeated titles. **Blatt.** (*A. J. O.*, 1924, v. 7, p. 745) *Intern. Sur. Ophth.*, 1924, v. 8, p. 79. **Caspar.** (*A. J. O.*, 1924, v. 7, p. 745) *Intern. Sur. Ophth.*, 1924, v. 8, p. 68. **Friede.** (*A. J. O.*, 1924, v. 7, p. 745) *Intern. Sur. Ophth.*, 1924, v. 8, p. 80. **Haass.** (*A. J. O.*, 1924, v. 7, p. 745) *Intern. Sur. Ophth.*, 1924, v. 8, p. 81. **Junés** *A. J. O.*, 1924, v. 7, p. 666) *Intern. Sur. Ophth.*, 1924, v. 8, p. 80. **Liebermann.** (*A. J. O.*, 1924, v. 7, p. 745) *Intern. Sur. Ophth.*, 1924, v. 7, p. 337. **Vogt.** (*A. J. O.*, 1924, v. 7, p. 745) *Intern. Sur. Ophth.*, 1924, v. 8, p. 81. **Wick.** (*A. J. O.*, 1924, v. 7, p. 745) *Intern. Sur. Ophth.*, 1924, v. 8, p. 88.
- DISEASES OF THE ORBIT.**
- Chomicki.** Supernumerary teeth developed in orbit. *Klin. Oczna*, 1923, No. 3. *Abst. Rev. Gén. d'Opht.*, 1924, v. 38, p. 55.
- Gaillard and Rollet.** Anatomy of sphenoidal sinus in connection with orbital vessels. *L'Oto-Rhino-Laryng. Internat.*, 1923. *Abst. Rev. Gén. d'Opht.*, 1924, v. 38, p. 55.
- Kalt and Lemaître.** Orbital osteoperiosteitis without sinus trouble. *Bull. Soc. d'Opht. de Paris*, 1923, Dec., p. 359.
- Kubik.** Exophthalmus and ocular muscles. (dis.) *Gesells. in Heidelberg*, 1924, June. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 786.
- Terson, A.** Abortion of phlegmon of orbit. *Ann. d'Ocul.*, 1924, v. 161, pp. 497-502.
- Tristaino.** Acute orbital dacryoadenitis. *Boll. d'Ocul.*, 1923, p. 144. *Abst. Rev. Gén. d'Opht.*, 1924, v. 38, p. 110.
- Zentmayer, W.** Traumatic enophthalmos. *A. J. O.*, 1924, v. 7, p. 712.
- INJURIES.**
- Allen, H. G.** Removal of foreign bodies from eye. *Med. Jour. Australia*, 1924, Aug. 2, pp. 110-113.
- Arnold, E. M.** Healed perforating wound of cornea. *A. J. O.*, 1924, v. 7, p. 711.
- Ascher.** Chalcosis of cornea, lens, vitreous humor and retina as seen with slit lamp. *Gesells. in Heidelberg*, 1924, June. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 763.
- Bailliart, P.** Detachment of anterior segment of iris from contusion of globe. *Bull. Soc. d'Opht. de Paris*, 1924, June, pp. 308-310.
- Burianesco.** Intraocular foreign body tolerated four years. *Abst. Ann. d'Ocul.*, 1924, v. 161, p. 551.
- Espino, J. M.** Large intraorbital foreign body. (4 ills.) *Soc. Med. de Caracas*, 1923, Nov., p. 1-4.
- Ezell, H.** Rupture of choroid. *A. J. O.*, 1924, v. 7, pp. 716-719.
- Genet.** Magnetic extraction of intraocular foreign body. *Abst. Clin. Opht.*, 1924, v. 28, p. 490.
- Magnetic foreign body extracted thru corneal wound. *Abst. Clin. Opht.*, 1924, v. 28, p. 489.
- Genet and Etievant.** Intraocular foreign body extracted by magnet. *Abst. Clin. Opht.*, 1924, v. 28, p. 490.
- Ghosh, N. N.** Complete traumatic dislocation of lens under conjunctiva. *Indian Med. Gaz.*, 1924, v. 59, p. 408.
- Griffith, A. D.** Traumatic luxation of eyeball birth injury. *Proc. Royal Soc. Med., Sec. on Opht.*, 1924, v. 17, p. 35.
- Hughes, R. A.** Cillum thru iris without symptoms. (1 ill.) *A. J. O.*, 1924, v. 7, p. 702.
- Jess.** Excessive bulbar siderosis. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 803.
- Krauss, F.** Rupture of iris followed by neuroretinitis. *A. J. O.*, 1924, v. 7, p. 713.
- Landolt, M.** Ocular irritation from carbon sulphide. *Bull. Soc. d'Opht. de Paris*, 1924, Feb., p. 81.
- Marquez.** Extraction of intraocular foreign bodies with giant magnet. *Arch. de Oft. Hisp.-Amer.*, 1924, v. 24, pp. 394-399.
- North, R. B.** Extraction of foreign bodies from eye. *Med. Jour. Australia*, 1924, Aug. 2, 1924, pp. 108-110.
- Toussaint.** Multiple intraocular foreign body. *Bruxelles Méd.*, March, 1924. *Abst. Clin. Opht.*, 1924, v. 28, p. 462.
- Velter, E.** Intraocular foreign bodies extracted transclerally. (2 ills.) *Bull. Soc. d'Opht. de Paris*, 1924, Jan., p. 58-62.
- Viterbi.** Histology of conjunctival plastics in perforating injuries of eye. (2 ills.) *Rev. Gén. d'Opht.*, 1924, v. 38, pp. 43-51.
- Waardenburg, P. J.** Injury of eye from ammonia. *Nederl. Tijds. v. Geneesk.*, 1924, v. 2, p. 372. *Abst. J. A. M. A.*, 1924, v. 83, p. 802.
- Zentmayer, W.** Traumatic detachment of choroid. *A. J. O.*, 1924, v. 7, p. 712.

- Repeated titles. **Gallemaerts**. (A. J. O., 1923, v. 6, p. 447) A. J. O., 1924, v. 7, p. 730. **Paderstein**. (A. J. O., 1924, v. 7, p. 667) Intern. Sur. Ophth., 1924, v. 8, p. 68.

## TUMORS.

- Aurand**. Melanotic sarcoma of choroid simulating acute primary glaucoma. Abst. Clin. Ophth., 1924, v. 28, p. 488.
- Barnert, C.** Chloroma of orbit. (1 pl. bibl.) Arch. of Ophth., 1924, v. 53, pp. 454-469.
- Besso**. Epibulbar melanosarcoma. Boll. d'Ocul., 1923, p. 67. Abst. Rev. Gén. d'Ophth., 1924, v. 38, p. 60.
- Buchanan, M.** Congenital papilloma of eyelids. A. J. O., 1924, v. 7, p. 711.
- Calhoun, F. P.** Dermoid tumor of corneoconjunctiva with scleral ectasia. (1 ill.) A. J. O., 1924, v. 7, pp. 669-670.
- Castroviejo, R.** Treatment of angiomas. (7 ills. bibl.) Arch. de Oft. Hisp.-Amer., 1924, v. 24, pp. 353-371.
- Castilla Ruiz, R.** Fibroadenoma of orbit. (2 ills.) Arch. de Oft. Hisp.-Amer., 1924, v. 24, pp. 391-394.
- Dejean, C.** Annular sarcoma of iris and ciliary body. (3 ills. bibl.) Arch. d'Ophth., 1924, v. 41, pp. 420-428.
- Denneberg**. Sarcoma of choroid. Klin. M. f. Augenh., 1924, v. 72, p. 801.
- Donnell, N. R.** Perithelioma of upper lid. (1 pl.) Arch. of Ophth., 1924, v. 53, pp. 411-415.
- Fietta, P.** Retrobulbar carcinoma of sinus origin. Rev. Gén. d'Ophth., 1924, v. 38, pp. 86-89.
- Golay, J.** Adenoma of lower lid. Zent. f. d. ges. Ophth. u. i. Grenz., 1924, v. 12, p. 483.
- Howell, C. M. H., and Critchley, M.** Retroocular tumor. Proc. Royal Soc. Med., Sec. on Ophth., 1924, v. 17, p. 48.
- Knapp**. X-ray treatment of ocular tumor. Abst. Klin. M. f. Augenh., 1924, v. 72, pp. 810-812.
- Knapp, A.** Bilateral glioma of retina with gliomatous involvement of iris. (2 pl. bibl.) Arch. of Ophth., 1924, v. 53, pp. 470-475.
- Lesser, H. R.** Glioma of optic nerve. (1 ill.) Clin. Med., 1924, Sept.
- Mann, I. C.** Orbital tumor in infant with skin metastases. Proc. Royal Soc. Med., Sec. on Ophth., 1924, v. 17, p. 46.
- Michail, D.** Sebaceous epithelioma of Zeiss's glands. Clujul Med., 1924, v. 5, pp. 18-20. Abst. Zent. f. d. ges. Ophth. u. i. Grenz., 1924, v. 12, p. 447.
- Miller, I. M.** Congenital dermoid cyst of cornea in conjunction with dermolipoma. (1 ill.) A. J. O., 1924, v. 7, p. 703.
- Pascheff**. Glioma and cyst of iris. Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 794.
- Pavia, J. L.** Recurring inflammatory fungus tumor of palpebral conjunctiva. (8 ills.) Semana Med., 1924, v. 31, pp. 326-331.

- Ratera, S. and J.** Retroocular fibroma cured by roentgen therapy. Siglo Med., 1924, v. 73, p. 644. Abst. Intern. Sur. Ophth., 1924, v. 8, p. 64.

- Rollet, Colrat and Trossart**. Orbital generalization of bilateral cancer of suprarenal capsule. Abst. Ann. d'Ocul., 1924, v. 161, p. 545.

- Salzer**. X-ray treatment of sarcoma of choroid. Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 765.

## PARASITES.

- Michail**. Cysticercus of orbit. Abst. Ann. d'Ocul., 1924, v. 161, p. 549.

- Purtscher**. Larva in vitreous. Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 764.

## COMPARATIVE OPHTHALMOLOGY.

- Mann, I. C.** Function of pecten. Brit. Jour. Ophth., 1924, v. 8, p. 209.

- Vrteľowna**. Change in color of skin after loss of vision. Compt. Rend. de la Soc. de Biol., 1924, v. 90, p. 1366. Abst. J. A. M. A., 1924, v. 83, p. 225.

## GENERAL PATHOLOGY.

- Kinnier-Wilson, S. A. and Macbride, H. J.** Cervical sympathetic lesion of central origin. Proc. Royal Soc. Med., Sec. on Ophth., 1924, v. 17, p. 47.

- Lauber and Kägi**. Hyaline changes in eye. Gesells. in Heidelberg, 1924, June. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 788.

- Scheerer**. Capillary microscopic findings. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 797.

- Seidel, E.** Experimental research on source and course of intraocular lymph flow. (3 ills.) Graefe's Arch. f. Ophth., 1924, v. 114, pp. 388-392.

- Tani, I.** Blood pressure and cell filtration. Biochem. Zeit., 1924, v. 145, pp. 189-200. Abst. Zent. f. d. ges. Ophth. u. i. Grenz., 1924, v. 12, p. 470.

- Repeated title. **Kleefeld**. (A. J. O., 1924, v. 7, p. 575) Brit. Jour. Ophth., 1924, v. 8, p. 436.

## GENERAL AND EXTRAOCULAR DISEASES.

- Amano, K.** Pathogenesis of ocular tuberculosis. Japan Med. World, 1924, v. 4, p. 214.

- Aszalos**. Myasthenia. Abst. Klin. M. f. Augenh., 1924, v. 72, p. 813.

- Canuyt and Terracol, J.** Ocular complications of frontomaxillary sinusitis. Arch. d'Ophth., 1924, v. 41, p. 445.

- Darrieux, J.** Syphilis in ophthalmology. Monde Méd., 1924, Aug., pp. 498-504.

- Davids, H.** Bacillus emulsion in tuberculous and scrofulous eye diseases. (bibl.) Graefe's Arch. f. Ophth., 1924, v. 114, pp. 212-234.

- Dawson, G. W.** Blindness and other ocular defects due to nasal diseases. Lancet, 1924, Aug. 16, pp. 318-319.

- Dundas-Grant, J.** Ocular disturbance attributed to nasal disease. *Jour. of Laryngol. and Otol.*, 1924, v. 39, p. 397.
- Espiño, J. M.** Ocular manifestations of leprosy. (bibl.) *Soc. Med. de Caracas*, 1923, Nov., pp. 4-17.
- Gumbiner, A.** Ocular manifestations of disease processes. (dis.) *California and Western Med.*, 1924, v. 22, pp. 443-447.
- Holmes, G.** Myasthenia gravis. *Proc. Royal Soc. Med., Sec. on Ophth.*, 1924, v. 17, p. 44.
- Ichikawa, K.** Ophthalmic changes in leucocytosis. *Abst. Japan Med. World*, 1924, v. 4, p. 213.
- Igersheimer, J.** Eye in tuberculous meningitis. *Graefe's Arch. f. Ophth.*, 1924, v. 114, pp. 267-275.
- Kagoshima, S.** Eye in anemia. *Japan Med. World*, 1924, v. 4, p. 213.
- Lemoine.** Successful results of ocular tuberculin therapy. *Bull. Soc. d'Opht. de Paris*, 1924, Feb., p. 98.
- Lillie, W. I.** Tryparsamide treatment of syphilis of central nervous system from ophthalmologic standpoint. (3 tables) *J. A. M. A.*, 1924, v. 83, pp. 809-813.
- Luczinski, W.** Oculocardiac reflex in pregnancy. *Polska Gaz. Lekar.*, 1923, No. 49. *Abst. Rev. Gén. d'Opht.*, 1924, v. 38, p. 100.
- Meyer, M.** Chronic encephalitis and eye disturbance. *Abst. Brit. Jour. Ophth.*, 1924, v. 8, p. 440.
- Paton, L.** Spleno-medullary leukemia. *Proc. Royal Soc. Med., Sec. on Ophth.*, 1924, v. 17, p. 43.
- Perez Buñill.** Treatment of ocular small pox. *Arch. de Oft. Hisp.-Amer.*, 1924, v. 24, pp. 371-390.
- Prieur, M.** Bordet-Wassermann reaction with antigen of Desmoulière. *Bull. Soc. d'Opht. de Paris*, 1924, April, pp. 162-186 and June, p. 343.
- Rathery, F.** Treatment of diabetes affecting eye. *Bull. Soc. d'Opht. de Paris*, 1923, Nov., pp. 320-335.
- Rist.** Ocular symptoms in extrapulmonary tuberculosis. *Bull. Soc. d'Opht. de Paris*, 1924, Feb., p. 100.
- Rossi.** Morphophysiologic determinism in ocular disease. *Congress Soc. franç. d'Opht.*, 1924, May. *Abst. Ann. d'Ocul.*, 1924, v. 161, p. 466.
- Rubert.** Tuberculin in eye diseases (Ponndorf). *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 827.
- Stasinski.** Ocular symptoms in first stages of sclerosis of tissues. *Nowing Lekar.*, 1923, No. 9. *Abst. Rev. Gén. d'Opht.*, 1924, v. 38, p. 73.
- Turner, A. L.** Relation of visual disturbances to affections of nasal cavities and sinuses. *Jour. of Laryngol. and Otol.*, Edinburgh, 1924, v. 39, p. 371.
- Unthoff.** Eye disorders in arteriosclerosis. *Gesells. in Heidelberg*, 1924, June. *Abst. Klin. M. f. Augenh.*, 1924, v. 72, p. 787.
- Vejdovsky, V.** Bismuth treatment of syphilis of eye. *Cas. Lek. Cesk.*, 1924, v. 63, p. 1096.
- Wylie, C. B.** Ocular disturbance due to intranasal pressure and sinus involvement. *West Virginia Med. Jour.*, 1924, v. 19, pp. 465-471.
- Repeated titles. **Bickel.** (*A. J. O.*, 1924, v. 6, p. 879) *Brit. Jour. Ophth.*, 1924, v. 8, p. 439. **Riva.** (*A. J. O.*, 1924, v. 7, p. 668) *Intern. Sur. Ophth.*, 1924, v. 8, p. 1. **Wassing.** (*A. J. O.*, 1924, v. 7, p. 747) *Intern. Sur. Ophth.*, 1924, v. 7, p. 315.
- ### VISUAL HYGIENE AND PROPHYLAXIS.
- Bloch, L.** Colored shooting glasses. *Deut. opt. Woch.*, 1924, v. 10, pp. 174-176. *Abst. Zent. f. d. ges. Ophth. u. i. Grenz.*, 1924, v. 12, p. 476.
- Committee on conservation of vision. *Medical Society of State of Pennsylvania. Atlantic Med. Jour.*, 1924, v. 27, p. 883.
- Friedenwald, H.** Nonshatterable glass. *A. J. O.*, 1924, v. 7, p. 702.
- Illumination of human eye. *Med. Jour. and Record*, 1924, v. 120, p. 239.
- Triand and Carboni.** Trachoma in North Africa and social prophylaxis. *Jour. de Méd. de Bordeaux*, 1924, v. 96, pp. 703-705.
- Washburn, C.** Responsibility in gonorrheal eye infections. *Jour. Florida Med. Assoc.*, 1924, v. 11, pp. 50-53.
- Repeated title. **Birch-Hirschfeld.** (*A. J. O.*, 1924, v. 7, p. 748) *Intern. Sur. Ophth.*, 1924, v. 8, p. 55.
- ### OPHTHALMIC SOCIOLOGY.
- Bürklen, K.** Script for blind. *Abst. Zent. f. d. ges. Ophth. u. i. Grenz.*, 1924, v. 12, p. 478.
- Loeb, C.** "Perfect sight without glasses." (Bates). *A. J. O.*, 1924, v. 7, pp. 720-723.
- Roche.** Vision for military service. *Bull. Soc. d'Opht. de Paris*, 1924, April, 1924, pp. 201-207.
- ### EDUCATION, HISTORY AND INSTITUTIONS.
- Enroth, E.** Ophthalmologic experience in Egypt. *Finska Läkär. Handl.*, 1924, v. 66, p. 457.
- Hill, E.** Organization of efficient department of ophthalmology in hospital. *A. J. O.*, 1924, v. 7, pp. 696-698.
- Jackson, E.** British Ophthalmological Society. *A. J. O.*, 1924, v. 7, p. 725.
- Ruyter, J. de.** Eye diseases in Java. *Zent. f. d. ges. Ophth. u. i. Grenz.*, 1924, v. 12, p. 387.
- Scheinfain, M. G.** Treatment of eye diseases in Astrachan, Russia. *Zent. f. d. ges. Ophth. u. i. Grenz.*, 1924, v. 12, p. 387.
- Valude, E.** Parent, 1849-1924. *Ann. d'Ocul.*, 1924, v. 161, pp. 481-483.
- Van der Hoeve, J.** Development of ophthalmology since 1849. *Nederl. Tijdschr. v. Geneesk.*, 1924, v. 2, pp. 33-43.
- Writing abstracts. *Brit. Jour. Ophth.*, 1924, v. 8, p. 422.